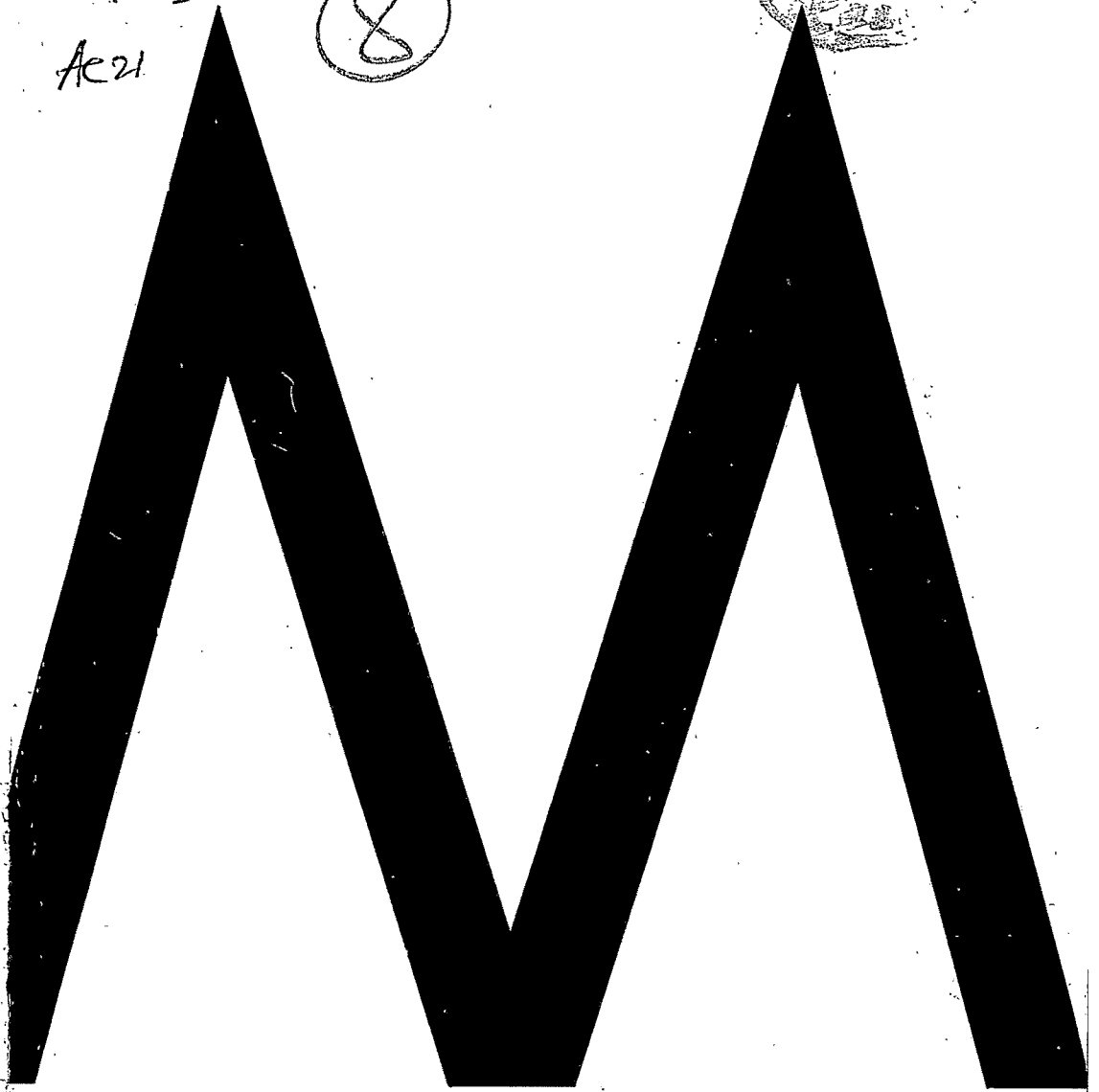


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ASSESSING THE EFFECTS OF INDUSTRIAL RELATIONS SYSTEMS AND EFFORTS TO IMPROVE THE QUALITY OF WORKING LIFE ON ORGANIZATIONAL EFFECTIVENESS

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MARK R. WEBER**

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This study assesses the relationships among characteristics of industrial relations systems, efforts to improve the quality of working life, and selected measures of organizational effectiveness in 25 manufacturing plants belonging to one company. On the basis of both research from organizational behavior and industrial relations, the paper offers the proposition that industrial relations systems affect organizational effectiveness through two channels. The empirical results show (1) strong evidence of an association between measures of the performance of industrial relations systems and economic performance, and (2) evidence that efforts to improve quality of working life have little impact on economic performance.

In recent years there have been many calls for a closer integration of the concepts, models, and methodologies of industrial relations and organizational behavior than currently exists (Bomers & Peterson, 1982; Brett, 1980; Fox, 1971, 1974; Kochan, 1980; Lewin & Feuille, 1983; Stephenson & Brotherton, 1979; Strauss, Miles, Snow, & Tannenbaum, 1974; Thomson & Warner, 1981). Indeed, recent literature reviews show that scholars have made considerable progress toward this end on topics such as worker participation (Brett & Hammer, 1982); union and management structure, union democracy, and internal union government (Strauss & Warner, 1977); organizational change (Rosow & Zager, 1982); and dispute resolution under collective bargaining (Anderson, 1981; Roomkin & Juris, 1982).

Despite this progress, no one has yet systematically addressed the theoretical question with perhaps the most potential for linking theory and research in these two fields—namely, what are the relationships between the basic institutional features of the industrial relations system and the effectiveness of organizations? This paper attempts to address this question in three ways. First, we develop theoretical propositions that relate variations in the performance of industrial relations systems among plants to variations

We wish to thank Pat Kravtin and Amos Even for their excellent research assistance. The Sloan Foundation provided partial support for this research.

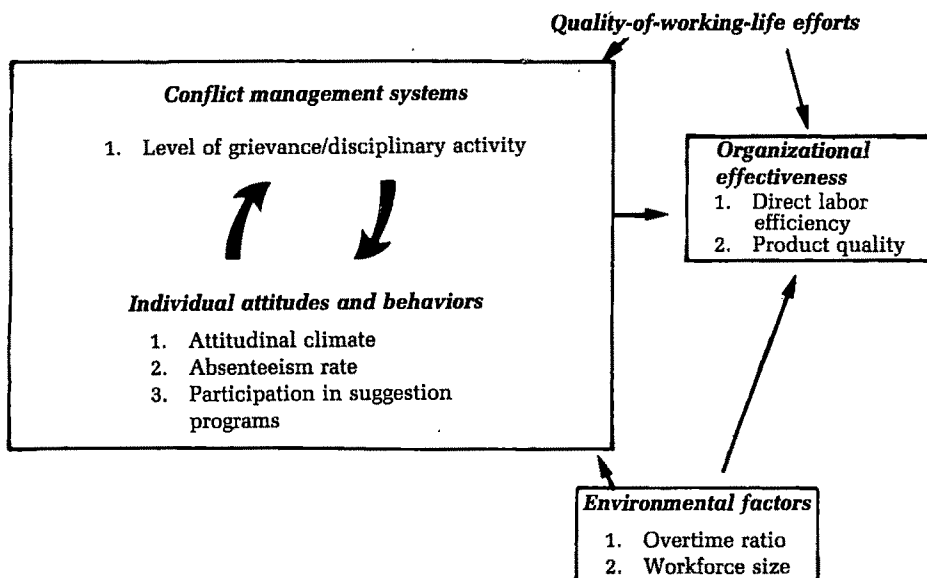
in organizational effectiveness among plants. Second, we test these propositions using a unique body of plant-level data that contains measures of several key dimensions of industrial relations performance and two economic dimensions of organizational effectiveness. Third, these data allow a test of whether a strategy of intervention into quality of working life can successfully modify a plant's organizational performance.

PERFORMANCE OF INDUSTRIAL RELATIONS SYSTEMS

The model developed in this study and diagrammed in detail in Figure 1 identifies two key dimensions of an industrial relations system (Dunlop, 1958): (1) conflict management and (2) individual attitudes and behavior. Although these dimensions do not exhaust the range of industrial relations systems, they capture the most important process aspects of U. S. collective bargaining—negotiations and contract administration (Kochan, 1980)—and relate these to the attitudes and behavior of individual employees.

Variations in how industrial relations systems perform on these two dimensions will, we expect, be causally related to variations in organizational effectiveness. More specifically, we propose that the less effective the performance of an industrial relations system on these two dimensions, the lower the level of organizational effectiveness that will result. This study treats economic performance as one—if not the—key dimension of organizational effectiveness. The specific measures of an organization's economic performance that are important will differ from one context to another; the measures of economic performance available for this study were (1) direct

FIGURE 1
Interrelationships among Industrial Relations Systems Properties, Environmental Factors, and Organizational Effectiveness



labor efficiency, a measure of labor costs and productivity, and (2) product quality. We propose, too, that efforts to improve the quality of working life (QWL) also affect economic performance both directly, and indirectly, through their influence on the performance of industrial relations systems.

Other more complicated causal relationships could be proposed relating the performance of industrial relations systems, organizational effectiveness, and QWL efforts. There might be, for example, feedback or reciprocal relationships between economic performance and industrial relations performance. Although to some extent these more complex relationships clearly exist, in the present study analysis proceeded under the hypothesis that the predominant causal flow runs in the directions outlined in Figure 1. This approach is consistent with both the conventional literature on collective bargaining and the efforts of management, union, and neutral practitioners who are attempting to change workplaces through quality-of-work-life and other interventions.

Substantive rules and practices governing the organization of work are a third channel through which industrial relations systems may influence organizational effectiveness. However, since the available data did not measure variations in substantive work rules across plants, our analysis did not test for the existence and effects of this third dimension.

Environmental Factors

Environmental factors like plant size, volume of work, and social and demographic characteristics of a workforce will influence both industrial relations and economic performance. To account for some of these factors, we controlled for the influence of (1) size of a plant's workforce and (2) use of overtime—a measure of a plant's capacity utilization—when assessing the relationship between industrial relations and economic performance.

Conflict Management Systems

One critical function of an industrial relations system is to establish procedures and processes for addressing problems that arise between employees and management. In the United States, unions and employers rely heavily on formal contract negotiations and grievance procedures for this purpose. We expect the effectiveness of such formal negotiation and conflict resolution mechanisms to be related to organizational effectiveness for at least three reasons.

First, since managing these formal representation procedures takes considerable time, people, and resources, the sheer volume of grievances and disciplinary actions that arise will affect the costs of managing an organization. To the extent that management and unions devote time and effort to these formal adversarial procedures, they limit resources available for training, problem solving, communications, and other activities linked to productivity, human resource management, or organizational development. We might describe this phenomenon as the displacement effect of high levels of formal grievance or negotiation activity (Katz, Kochan, & Gobeille, 1983).

Second, volume of grievances and disciplinary actions can indicate either the success or failure of the parties to communicate effectively or to resolve differences during initial stages of formal procedures. Thus, a large number of grievances or disciplinary actions signal deep-seated problems in the systems of an organization devoted to conflict resolution and problem solving. Consequently, volume of grievances and disciplinary actions should be systematically related to other measures of the performance of an industrial relations system. Results of a good deal of previous research on determinants of grievance rates have been consistent with this hypothesis (Katz et al., 1983; Knight, 1978; Peach & Livernash, 1974; Thomson & Murray, 1976).

Third, because formal grievance and bargaining processes focus on distributive issues, such processes inherently entail some degree of political and tactical posturing, gamesmanship, bluffing, and commitment-building tactics (Schelling, 1960; Walton & McKersie, 1965). To the extent that these political or distributive bargaining tactics escalate, persist over time, and spread across the entire range of issues that the parties deal with, a high conflict/low trust syndrome (Fox, 1974: 120–142) can set in—the inherently adversarial patterns that originate in distributive bargaining may destroy the potential for integrative bargaining or cooperation even on those issues in which the parties share interests. A belief that this situation is a common feature of current American industrial relations has given rise to criticism of our system as “too adversarial” (Barbash, 1981:1).

For these three reasons, we hypothesize that indicators of a relatively high degree of conflict between labor and management at the shop floor level will be associated with lower efficiency, poorer quality, and generally, poorer organizational performance than would accompany a low degree of conflict. Second, we hypothesize that strong interrelationships among the various indicators of conflict intensity will exist and will reflect a latent conflict-management construct.

It should be noted that conflict resolution systems, which serve important and useful functions for labor and management, have endured the test of time as a means for resolving the inevitable conflicts of employment relationships and for protecting the individual rights of employees. It is not their existence per se, but their poor performance that we expect will diminish the level of organizational performance.

Worker Motivation, Commitment, Involvement, and Performance

A conflict resolution system reflects broad institutional features of an industrial relations system, but it is clear that the motivation, attitudes, and behavior of individuals and informal work groups can exert independent effects on organizational performance. Yet, there has been a longstanding (Brayfield & Crockett, 1955; Herzberg, Mauser, & Snyderman, 1959; Schwab & Cummings, 1970) and to date unresolved (Dyer & Schwab, 1982) debate on the direction and strength of such causal relationships. On the one hand, abundant evidence has suggested that there is no consistent or simple causal relationship between the satisfaction and the performance of individual

workers (Schwab & Cummings, 1970). On the other hand, many theoretical arguments have suggested that individual worker ability, motivation, and participation in job-related decision making affect both organizational effectiveness and individual worker satisfaction (Goodman, 1979; Hackman & Oldham, 1976; Lawler & Ledford, 1982; Mowday, Porter, & Steers, 1982; Walton, 1980). If workers are willing and able to make suggestions and to otherwise participate in a search for ways to improve job performance, and if these efforts endure over time, high levels of motivation, commitment, and participation on the part of individual workers should improve organizational effectiveness and the level of worker satisfaction.

These potential positive links between individual attitudes and behavior, and organizational effectiveness can only endure over time if the encompassing economic and institutional environment maintains support for high levels of individual involvement and labor management cooperation (Kochan & Dyer, 1976; Walton, 1980). Unless the overall union-management relationship and management systems remain supportive, and workers experience tangible rewards from their involvement, high levels of commitment are likely to either gradually atrophy (Walton, 1980) or end abruptly over some visible conflict (Goodman, 1979).

Rate of absenteeism is another aspect of individual behavior that we expect will be related to other outcomes of the performance of industrial relations systems. Although evidence on the strength of the relationship between job satisfaction and the frequency with which an individual worker is absent has been mixed (Dyer & Schwab, 1982), Steers and Rhodes (1978) argued that voluntary absenteeism should be related to employee motivation. Others have suggested that the relationships between the aggregate organization-wide rates of absenteeism and worker attitudes, commitment, and other aspects of industrial relations should be stronger than the relationship between individual worker attitudes and absenteeism (Nicholson, Brown, & Chadwick-Jones, 1976). In any event, costs imposed by high rates of absenteeism should exert an independent effect on organizational performance (Hackman & Lawler, 1971) regardless of the relationship between absenteeism and other industrial relations outcomes.

Therefore, measures of employee participation in suggestion programs, employee attitudes, and absenteeism rates will, we expect, be related to other measures of the performance of industrial relations systems and will affect organizational performance. Although these measures cover a wide variety of phenomena that have traditionally been treated as separate constructs by industrial and organizational psychologists, we hypothesize that they are all part of an underlying construct that we call the individual attitudes and behavior dimension of the performance of industrial relations systems.

Figure 1 diagrams the following theoretical propositions outlined in the preceding pages:

Hypothesis 1: The higher the conflict in negotiations and contract administration, the higher the level of absenteeism



and the less positive will be measures of individual worker attitudes and work behavior.

Hypothesis 2: The higher the conflict in negotiations and contract administration, the lower the levels of organizational performance.

Hypothesis 3: The higher the levels of worker attitudes and work behavior, the higher the organizational performance.

Hypothesis 4: The greater the participation in programs addressing the quality of working life, the lower the level of conflict and the more positive the worker attitudes and work behavior.

Hypothesis 5: The greater the participation in quality-of-work-life programs, the better the organizational performance.

In summary, we propose that conflict management and individual worker attitudes and behavior are key dimensions of industrial relations systems that influence organizational effectiveness. Over time, these dimensions become causally interrelated in a reinforcing cycle. Worker dissatisfaction or lack of trust may elevate numbers of grievances and disciplinary actions, and lead to a more adversarial relationship between workers and management than existed before. The high conflict/low trust syndrome will then reinforce supervisors' belief in the need for rigid, authoritarian styles of supervision, and employee motivation, job performance, and commitment to an organization will decline.

THE ROLE OF EFFORTS TO IMPROVE THE QUALITY OF WORKING LIFE

Recent years have seen major growth in the number of QWL programs that attempt (1) to intervene in and modify the performance of industrial relations systems, and (2) to enhance organizational performance (Kochan, Katz, & Mower, 1984; Rosow & Zager, 1982). Such efforts are a strategy for breaking the cycle of events described in the preceding paragraph in order to initiate changes that will reverse the high conflict/low trust pattern and support individual employee participation and involvement. To the extent these efforts succeed in increasing trust, employee involvement, and problem solving, we expect them to lead to short-term improvements in both worker satisfaction and organizational effectiveness. Improved trust and problem solving and a more participative managerial style may also lower grievance rates, or may increase the number of settlements made early in grievance procedures. Advanced efforts to improve quality of working life may also expand flexibility in work rules (Kochan et al., 1984). To the extent that these efforts attempting to change work organization can coexist with ongoing distributive aspects of bargaining relationships and can survive politi-

cal and economic pressures over time, we can expect them to help organizations maintain relatively high levels of organizational effectiveness.

Because of the hypothesized importance of overall contexts—economic environment, distributive bargaining, organizational policies, union-management climate, and so forth—a longitudinal research design sensitive to the cycle of activities that occur in a normal bargaining relationship is critical to evaluating efforts to improve quality of working life. Short-term improvements in worker attitudes, motivation, grievance rates, and even measures of economic performance are necessary but not sufficient tests of the effects of QWL interventions. The more telling test is whether industry can maintain positive effects through a complete cycle of contract negotiations, negotiation of changes in local work rules, and turnover of key management or union decision makers; also telling are events in an even broader context—for instance, engagement of management and union officials in major bargains over strategic issues like the organization of new plants or reinvestment of resources in existing plants.

All of these tests obviously cannot figure in the empirical analysis to follow, nor is it likely that any single future study could include all of them. We have specified these comprehensive design criteria here to put this and future work in perspective. This paper presents results of a study that benefited from a rich data set collected as part of the information system of a major company.

DATA AND ANALYSIS PLAN

The data for this study, collected from a large durable goods manufacturer in the United States, are observations covering the years 1978-80 from the company's 25 manufacturing facilities. The technology and product in all of the plants, which employ roughly 50,000 persons and have annual sales over one-billion dollars, are very similar. Furthermore, all the hourly workers in these plants belong to the same industrial union.

The overall data set provided a pooled cross-section sample of 75 observations—25 plants for three years—for several measures of industrial relations systems and economic performance; missing data reduced this sample in some of the analyses.

Measures of the Performance of Industrial Relations Systems

Variable names and definitions of the industrial relations performance measures included in the analysis are:

1. Grievance rate: the number of grievances filed per 100 workers.
2. Absenteeism rate: the absenteeism rate of hourly workers as a percentage of straight time hours, excluding contractual days off.
3. Disciplinary action rate: the number of disciplinary actions involving suspension or some more severe penalty per 100 workers.
4. Salaried workers' attitudes: A survey asked salaried employees, including first line supervisors, a number of questions regarding compensation and benefit levels, working environment, relation-

ships with supervisors and subordinates, and career progress. Low-score responses indicated dissatisfaction. A summary score was derived from these surveys for each plant. The variable used was the percentage of respondents in each plant that had an overall survey score greater than 3.2 on a 1 to 5 scale, because this was the only measure stored in the information system of each plant.

5. Participation in suggestion programs: the percentage of hourly employees that submitted at least one suggestion during the year to a plant's suggestion program.

Two of these variables capture aspects of the formal conflict resolution systems in these organizations, and three measure aspects of individual attitudes and behavior.

Economic Performance Measures

The organizational effectiveness measures available for this study primarily capture certain key dimensions of the economic performance of each plant. Although economic performance is most likely the most important dimension of organization effectiveness, it is not necessarily synonymous with the broader construct.

Direct labor efficiency and product quality in each plant were our measures of economic performance. A description of these variables follows.

1. Direct labor efficiency: an index that compared actual hours of direct labor input to standardized hours calculated by the company's industrial engineers. The labor standards used in this index were adjusted for variations in product attributes. A high direct labor index was associated with relatively high efficiency and low costs.
2. Quality of product: a quality index derived from a count of the number of faults and demerits that appeared in inspections of the product. High quality score indicated relatively good product quality.

Environmental Measures

A number of economic and social environmental factors will influence industrial relations and economic performance in plants. This data set included:

1. Overtime ratio: the ratio of the annual number of overtime hours over the number of straight-time hours worked by all production workers.
2. Workforce size: the average number of hourly workers in a plant.

Measures of Efforts to Improve Quality of Working Life

With the cooperation of the union representing its workforce, this company began to implement programs addressing the quality of working life in its plants in 1973. From 1973 through 1980, the actual development of these programs among salaried and hourly employees varied widely across the plants; however, most of the plants did not develop much program activity

until after 1978, when a drop in the company's sales caused employment to drop sharply. The QWL activities in these plants included quality circles; informal meetings between plant managers, workers, and union officials; and other forms of enhanced communication between labor and management. Elsewhere (Katz et al., 1983), we have used a weighted score of similar programs to measure the intensity of various plants' efforts to improve quality of working life. Here, we measured the extent of QWL programs' development by the percentage of hourly employees involved in some form of QWL program in each plant for the years 1978-80—designated as involvement in QWL programs. These figures, annual estimates provided by the personnel director in each plant, were not available for 1978 and 1979 for a few of the plants, which reduced the sample size in the analyses involving this variable.

Our analysis starts with a description of the variations in the performance of industrial relations systems and in economic performance across the plants. Then, we review the correlations that exist among the various measures of industrial relations performance. We then report the correlations between the measures of industrial relations performance, hourly workers' involvement in QWL programs, the environmental variables, and the measures of economic performance. Finally, we use regression analysis to test the propositions relating efforts to improve quality of working life, performance of industrial relations systems, and economic performance.

RESULTS

Table 1 reports the mean, minimum, and maximum values of the measures available across the company's 25 plants in 1980. These descriptive statistics illustrate the importance of examining the diversity of outcomes that collective bargaining can produce in different plants. Despite their sharing a common technology, union, and employer, the plants providing these data showed a wide variation in grievance rates, discipline rates, absenteeism, and other measures of industrial relations and economic performance. Note, for example, that in 1980, grievances per one hundred workers varied from a

TABLE 1
Mean, Minimum, and Maximum Values for Industrial Relations, Economic, and QWL Program Involvement Variables, 1980

Variables ^a	Means	Minimum Values	Maximum Values	Standard Deviations
Grievance rate	45.9	5.5	121.1	25.7
Absenteeism rate	6.3	4.6	8.8	1.1
Disciplinary actions rate	4.5	0.9	15.4	3.2
Salaried workers' attitudes	54.4	40.0	74.0	7.9
Participation in suggestion programs	17.8	8.0	37.3	7.6
Direct labor efficiency	-0.2	-23.7	20.4	9.6
Quality of product	129.3	119.0	140.0	6.8
QWL-program involvement	15.7	0.0	72.4	24.2

^aAll variables refer to hourly workers unless otherwise indicated.

low of 5 in one plant to a high of 121 in another plant; absenteeism varied between 4.6 percent and 8.8 percent; direct labor efficiency varied from 20.4 percent above standard to 23.7 percent below standard.

The measures of worker participation in suggestion programs, salaried employee attitudes, and involvement in QWL programs also reveal wide variation across plants. In 1980, the percentage of hourly workers participating in suggestion programs ranged from 8.0 to 37.3 percent, and the percentage of salaried employees with high scores on the QWL attitude survey was 40 percent in one plant, and 74 percent in another. The percentage of hourly workers involved in QWL programs ranged from 0 to 72 percent. The wide variation in level of involvement in such programs across the company suggests some of the difficulties involved in introducing them.

Relationships among Measures of Performance of Industrial Relations Systems

The data were pooled across the 25 plants and three years, 1978-80. Table 2 presents the correlations among the measures of performance of industrial relations systems in this pooled sample.

The results reveal a correlation ($r = .29, p < .01$) between the two measures of labor-management conflict, grievance rate and disciplinary action rate. Similarly, the data show strong intercorrelations between the various measures of individual attitudes and behavior; for instance, positive attitudes are correlated with relatively low absenteeism rates ($r = -.48, p < .01$) and high levels of participation in the suggestion program ($r = .43, p < .01$).

The data reveal a strong connection between indicators of level of conflict and measures of employee attitudes and participation, providing support for Hypothesis 1. For example, positive attitudes among salaried personnel are associated with relatively low grievance rates ($r = -.47, p < .01$) and disciplinary action rates ($r = -.36, p < .01$). The connection between individual

TABLE 2
Intercorrelations among Variables Measuring Industrial Relations Performance and QWL-Program Involvement^a

	1	2	3	4	5	6
1. Grievance rate	1.00					
2. Absenteeism rate	.26**	1.00				
3. Disciplinary actions rate	.29***	.41***	1.00			
4. Salaried workers' attitudes	-.47***	-.48***	-.36***	1.00		
5. Participation in suggestion programs	-.27***	-.13	.16	.43***	1.00	
6. QWL-program involvement	-.19*	.03	-.20*	.38***	.43***	1.00

^aThere are 66 observations for the correlations including involvement in QWL programs and 75 observations in all other cases.

* $p < .10$

** $p < .05$

*** $p < .01$

behavior and level of conflict also is revealed in associations between absenteeism rates and hourly workers' participation in suggestion programs, and grievance and discipline rates. These interrelationships are consistent in both direction and magnitude with those found in a similar data set from a different set of plants (cf. Katz et al., 1983).

Table 2 also reveals that relatively high levels of involvement by hourly employees in QWL programs is correlated with relatively good attitudes among salaried employees, high levels of participation in suggestion programs, and low grievance and discipline rates. This finding could reflect the fact that involvement in programs to improve the quality of working life improves the performance of industrial relations systems or it may merely reflect the fact that plants with better industrial relations performance tend to develop such programs more extensively than do other plants. The regression analysis reported later provides a more refined test of these hypotheses.

Relationships between Performance of Industrial Relations Systems, QWL Involvement, Environmental Factors, and Economic Performance

Table 3 presents correlations between measures of economic performance and the other variables, correlations that provide strong support for Hypotheses 2 and 3—that is, that level of conflict and individual attitudes and behavior affect economic performance.

The indicators of conflict intensity in plants are strongly associated with the economic performance indicators. For example, relatively high discipline rates are significantly associated with fairly low direct labor efficiency ($r = -.25, p < .01$) and with relatively poor product quality ($r = -.21, p < .05$).

A number of correlations reveal a connection between individual attitudes and behavior, and economic performance. Positive attitudes of sala-

TABLE 3
Correlations between All Other Variables^a
and Economic Performance Measures

	Direct Labor Efficiency	Quality of Product
Grievance rate	-.48***	-.18***
Disciplinary actions rate	-.25***	-.21**
Absenteeism rate	-.25**	.05
Salaried workers' attitudes	.40***	.48***
Participation in suggestion programs	.38***	.73***
QWL-program involvement	.17*	.26**
Overtime ratio	-.28***	-.40***
Workforce size	-.31***	-.33***

^aThe sample size is 66 for the correlations including involvement in QWL programs and 75 for all other cases.

* $p < .10$

** $p < .05$

*** $p < .01$

ried employees are associated with relatively high direct labor efficiency ($r = .40, p < .01$) and relatively good product quality ($r = .48, p < .01$). Similarly, the more suggestions offered per employee, the higher the direct labor efficiency ($r = .38, p < .01$) and the better the product quality ($r = .73, p < .01$).

The data also reveal a positive association between comparatively high levels of hourly workers' involvement in QWL programs and relatively high levels of direct labor efficiency and product quality. Table 3 also shows that extensive use of overtime and large workforce size are associated with comparatively low labor efficiency and product quality.

Correlation analysis reveals associations, but it does not provide tests of causality. Implicit in the model outlined in Figure 1 is the hypothesis that the performance of industrial relations systems and involvement in efforts to improve the quality of working life affect plant level economic performance after the influence of environmental factors has been controlled. The next section reports regression analyses that further test these hypotheses.

Results of Regression Analyses

Pooled time-series/cross-section regressions were estimated with data from the 25 plants for the years 1978-80. We used direct labor efficiency and product quality as the dependent variables; hourly workers' involvement in programs addressing quality of working life, and the various industrial relations performance measures as the independent variables; and the overtime ratio and workforce size as control variables. Table 4 reports the results of these regressions; one-tailed *t*-tests are reported for the coefficients because the hypotheses stated the signs of the coefficients.

Given the high degree of intercorrelation between various industrial relations performance measures shown in Table 2, the coefficients on the individual measures of industrial relations systems will not provide a good test of the composite effects of industrial relations performance on economic performance. However, comparing the R^2 s obtained by estimating equations with and without all the industrial relations performance measures as control variables provides such a test. Thus, some of the equations reported in Table 4 do not include the measures of performance of industrial relations systems as control variables.

With regard to the impact of individual measures of the performance of industrial relations systems, the regression reported in Column 1 in Table 4 indicates a statistically significant effect for rate of disciplinary actions ($p < .01$) and salaried workers' attitudes ($p < .05$) on direct labor efficiency. The regression in Column 3 indicates a statistically significant effect for participation in suggestion programs ($p < .01$) and salaried workers' attitudes ($p < .10$) on product quality.

The R^2 rises from .242 (Column 2) to .467 (Column 1) when all the industrial relations variables appear in the direct labor regression, indicating a large cumulative effect for performance of industrial relations systems on direct labor efficiency. This is a statistically significant effect ($F = 4.64, p < .01$). Similarly, the industrial relations variables as a set have a strong cumulative

TABLE 4
Results of Regression Analyses of the Effect of All Other
Variables on Economic Performance

Explanatory Variables		Direct Labor Efficiency		Product Quality	
		(1)	(2)	(3)	(4)
Intercept		-16.528	9.062	109.490	139.202
Overtime ratio	b ^a	28.729	-10.944	-22.893	-57.825***
	β	.119	-.045	-.123	-.311
	t	.927	.383	1.230	2.759
Workforce size	b	.022	-.320***	.0002	-.002***
	β	.032	-.467	.042	-.371
	t	.169	4.040	.284	3.276
Grievance rate	b	-.054		.0002	
	β	-.189		.077	
	t	1.400		.727	
Disciplinary action rate	b	-.077***		-.0002	
	β	-.471		-.149	
	t	2.690		1.097	
Absenteeism rate	b	.411		.005	
	β	.079		.124	
	t	.632		1.272	
Salaried workers' attitudes	b	.349**		.130*	
	β	.334		.161	
	t	2.273		1.403	
Participation in suggestion programs	b	.028		.007***	
	β	.018		.754	
	t	.122		6.618	
QWL-program involvement	b	-.023	.019	-.0001**	.0002
	β	-.065	.053	-.183	.090
	t	.552	.442	1.984	.793
	R ²	.467	.242	.675	.310
	F	6.014	6.369	14.272	9.001
	n	64	64	64	64

^ab is the regression coefficient, β is the standardized coefficient, and t is the t ratio.

* = $p < .10$ level, one-tailed test.

** = $p < .05$ level, one-tailed test.

*** = $p < .01$ level, one-tailed test.

and statistically significant effect on product quality: the R^2 rises from .310 when the industrial relations variables are not all in the quality regression (Column 4) and .675 when all are included (Column 3).

These results, consistent with the correlations reported in Table 3, provide strong evidence that the performance of industrial relations systems in a plant affects that plant's economic performance.

With regard to the effect of involvement in QWL programs, the regressions reported in Table 4 provide no evidence that such programs have a

positive effect on either product quality or direct labor efficiency. Even when we excluded the industrial relations variables, in both the product quality and direct-labor-efficiency equations, the coefficient for involvement in QWL programs is small and statistically insignificant (Columns 2 and 4). The coefficients for that variable in the regressions reported in Columns 2 and 4 in Table 4 measure the total effects QWL programs exerted on, respectively, direct labor efficiency and product quality. Since these coefficients are near zero and statistically insignificant, there is no point in using them to derive estimates of the influence that such programs might exert indirectly on either direct labor efficiency or product quality through effects on the performance of an industrial relations system.

In summary, the regressions suggest that the performance of an industrial relations system—as measured by rates of grievances, disciplinary actions, and absenteeism, and by salaried workers' attitudes and hourly workers' participation in suggestion programs—affects economic performance. The regressions also suggest that hourly workers' involvement in programs addressing quality of working life has no impact on economic performance. Together, these findings indicate that the correlations, reported in Table 2, between the industrial relations performance measures and involvement in QWL programs reflect the fact that plants with comparatively good industrial relations performance tend to develop relatively more extensive QWL involvement, and not vice versa.

The simple correlations reported in Table 3 and the regression coefficients in Columns 2 and 4 of Table 4 show that relatively large workforces and extensive use of overtime are associated with relatively low direct labor efficiency and product quality. It is interesting to note that when the industrial relations variables are included in the regressions reported in Columns 1 and 3 of Table 4, the coefficients for workforce size and the overtime ratio are no longer statistically significant, suggesting that the influence of these environmental variables on economic performance is mediated through their effects on industrial relations performance.

DISCUSSION

The industrial relations and economic performance measures indicate that substantial diversity in performance exists among the plants in this company, even given many common institutional and background factors. The extent of this diversity supports our claim that collecting comparable plant-level data can be a valuable tool for industrial relations and organizational behavior practitioners and researchers.

Correlations between the various measures of the performance of industrial relations systems support our hypotheses regarding the unity of industrial relations systems. The two measures of conflict—rates of grievances and disciplinary actions—are highly correlated with each other, as are the measures of individual behavior and attitudes—absenteeism rates, participation in suggestion programs, and attitudes. Moreover, the individual attitudes

and behavior measures are strongly related to the measures of plant-level conflict intensity.

Correlation analysis also reveals strong evidence of an association between measures of industrial relations and economic performance. Regression analysis, controlling for the influence of environmental factors, provides evidence of a statistically significant association between both rate of disciplinary actions and salaried workers' attitudes, and direct labor efficiency. The regressions also reveal a statistically significant association between participation in suggestion programs and product quality. Moreover, in the regressions, the industrial relations measures as a group explain a large part of the variation in direct labor efficiency and product quality.

The data reveal a slow and limited diffusion of involvement in programs addressing quality of working life among hourly workers in this company. Correlation analysis does show an association between such involvement and a number of the industrial relations measures. However, regression analysis identifies no effect for such involvement on either direct labor efficiency or product quality.

The results of this research reinforce our belief in the value of integrating theory and methods from organizational behavior and industrial relations. A number of specific theoretical and methodological benefits for the field of organizational behavior flow from this type of research. The regression results and correlational evidence presented here provide ample incentives for further research into the causal relationships between the effectiveness of industrial relations systems and organizations. Focusing on observable and concrete industrial relations variables allows organizational behavior researchers to answer the long-standing criticism that much of their research relies too heavily on correlations between subjective questionnaire responses that are prone to priming, consistency, or social response biases (Salancik & Pfeffer, 1977). Using objective measures of organizational effectiveness such as productivity, costs, product quality, innovation, and so forth, also enhances the validity and generalizability of this type of research, and therefore its credibility with practitioners. Finally, the theory presented here relates institutional-level (conflict management) and individual-level (attitudes and behavior) measures of industrial relations performance to organizational effectiveness, and thus provides a promising way of solving one of the oldest puzzles in the field: is there some causal connection between individual attitudes and organizational performance?

The benefits to industrial relations theory of further research along these lines are also sizable. Many industrial relations scholars have traditionally assumed that the time-tested institutions and practices associated with collective bargaining are the most effective means of managing the diverse interests that exist in employment relationships. This has led to substantial resistance among some researchers, and some practitioners, to the introduction of behavioral science concepts and strategies for reforming collective bargaining in workplaces. Yet, managers are using an increasing amount of behavioral science in both union and nonunion workplaces. Thus, industrial

relations researchers and practitioners need to examine how these concepts and strategies affect and interact with existing institutions used to govern employment relationships.

Finally, further theoretical and empirical research along these lines will have an added benefit, especially if longitudinal research designs become more widely used than they have been in the past. By studying the dynamics of industrial relations and organizational performance through periods of changing economic and market conditions, scholars can introduce and strengthen micro-economic foundations in organizational research.

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EFFICIENCY OF PRODUCT R&D IN BUSINESS UNITS: THE ROLE OF STRATEGIC CONTEXT

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This paper examines several contextual variables that are thought to affect the relationship between a firm's innovative inputs and outputs. Six-year patterns for a sample of mature industrial-product business units drawn from the PIMS data base indicate evidence that innovative efficiency is related to all four classes of variables examined: technological opportunity, scale and R&D experience of the business, market linkages, and manufacturing suitability.

The development of new products is an essential part of many firms' strategies for thriving in the remainder of this century. Yet, for many of these firms, the factors promoting the conversion of R&D expenditures into later sales and profits are poorly understood. Skeptical executives view R&D as the sink hole of the 1980s—the role many cast advertising in throughout the 1950s and 1960s. This attitude will persist until the factors leading to efficiency in R&D spending are better known. This paper explores a major set of such factors, namely the strategic context—the competitive circumstances and strategic position of a business.

Most research by economists on R&D has been on two issues tangential to the problem of managing for new products. The first type of inquiry has sought to determine whether there are any payoffs at all from R&D—at a societal level, at an industry level, or sometimes, at the firm level—with far from conclusive results (e.g., Griliches, 1980; Mansfield, Rapoport, Romeo, Wagner, & Beardsley, 1977; Terleckyi, 1974). The second type of study has focused on the determinants of R&D spending, within the context of attempts to understand the behavior of organizations (e.g., Hambrick, MacMillan, & Barbosa, 1983; Grabowski & Mueller, 1972; Scherer, 1967).

The managerial question, "What factors affect the likelihood and magnitude of payoffs from product R&D?" has been the object of much thought and anecdotal study but of relatively little systematic, large-scale inquiry.

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Findings, such as those to be discussed below, are gradually accumulating, but tend to be fragmented since each researcher usually focuses on some limited set of predictors, ranging from an economist's focus on industry structure (e.g., Mansfield, 1968a) to an organizational theorist's focus on laboratory information flows (e.g., Tushman, 1979).

In this paper we investigate systematically several factors that may affect the relationship between innovative inputs, represented here by product R&D expenses, and outputs, represented by new product sales. Our unit of analysis is the individual business unit within a firm. The predictor variables examined are key aspects of the context in which innovation is attempted, rather than the process by which it is attempted. The paper presents a theoretical integration of these contextual factors and tests for their effects using a sample drawn from the PIMS (Profit Impact of Market Strategies) data base.

Before proceeding to the literature review, we think it will be useful to discuss several key features of the study. First, it focused on innovation in business units, unlike past studies that have examined the total R&D expenditures of entire corporations—even though estimates indicate that 85 percent of *Fortune* 500 firms are active in more than one industry (Rumelt, 1974, 1977). Moreover, in a recent study of diversification and decentralization, Vancil (1979) found that in the firms he sampled an average of only 36 percent of all R&D activity occurred at the corporate level, the rest taking place in decentralized labs located in operating groups or divisions. Furthermore, 47 percent of the firms Vancil sampled conducted *all* of their R&D at the business unit level. So, the study of innovation at the business level comes much closer to the locus of new product introductions and competitive interplay than does the study of overall corporate innovation.

A second feature of the present study is that it deals strictly with product R&D. Process R&D and corporate-level R&D, which tend to be more basic research (Johnson, 1975) than product R&D, were excluded.

Third, the study used sales of new products as its indicator of innovative output. This has an advantage over the more traditional use of patent statistics because it reflects the importance and market acceptance of innovation (Kamien & Schwartz, 1975). It has the disadvantage of requiring some subjective interpretation as to what qualifies as a new product, a problem we will discuss in the Methods section. This study stopped short of attempting to trace the links between product R&D and later profits; such links need to be studied, but to do so would require sample sizes and time-series data far beyond what were available for this study.

A final feature of note is that the study examined lagged relationships between R&D spending and new product sales. We constructed an appropriate lag based on theory and empirical evidence.

THEORY AND PROPOSITIONS

Any number of models of the innovation process could be postulated. To develop the argument for the approach used in this study, it is useful to

juxtapose two extreme and unrealistic views. The first is that innovation is a deterministic process driven purely by spending. If such were the case, there would be a very high correlation between R&D spending and innovative output—yet studies consistently yield correlations of .20 to .50 (Comanor & Scherer, 1969; McLean & Round, 1978). With correlations like these, it is obvious that innovative output is in part a function of inputs, but, as Kamien and Schwartz concluded, “the transformation may depend on factors other than effort” (1975:6). Another view is that these factors are random—that innovation is merely a lottery. Although we grant that luck plays a role in the innovative process, we assert that its role is at least rivaled by other discernible factors—some in the environment and some under management control—but all potentially knowable and hence of use in explaining payoffs from R&D.

These factors can be broadly classified as the context of innovation and the process of innovation. Context refers to the environment and broad organizational milieu in which the innovative attempt is situated. Process refers to the way in which the innovative attempt itself is carried out. Obviously there are points of overlap between these two categories—for example, the technical background of a sales force could be taken either as context or as an indicator of process.

We suspect that both context and process contribute greatly to predicting innovative efficiency, which we define as the degree to which innovative outputs exceed what would typically be expected from a given level of R&D inputs. Given the nature of our data, the emphasis of this paper is strictly on context. In particular, we posit that five contextual factors promote innovative efficiency. These factors are: (1) technological opportunity, (2) scale and R&D experience of the business, (3) market linkages, (4) manufacturing suitability, and (5) organizational structure and culture.

Technological Opportunity

Not all industries lend themselves equally to innovation. Phillips (1966:301) was instrumental in asserting the positive role of “technological opportunity” on innovation rates. He defined the term as the “extent of basic scientific knowledge in the field.” Later, Comanor associated the term with ease of product differentiation (1967). Our own view is that technological opportunity must also have a market reference—that it is a function of the degree to which the market seeks or accepts product changes. These three views are not inconsistent and, taken together, suggest that R&D is much like farming or drilling for oil. It is relatively inexpensive to obtain yield from fertile land or abundant fields, whereas yield from less munificent terrain, although quite possible to obtain, is much more expensive.

This rationale suggests our first hypothesis:

Hypothesis 1: An industry's new product sales rate will be positively related to a firm's innovative efficiency.

Industries are not necessarily static in their degree of technological opportunity. Foster (1982) asserted that industries move through technologi-

cal eras and that innovation efficiency varies throughout each era. Examples of eras are the transistor era for radios and the ball-point era for writing instruments. Foster argued that early in a technological era, progress is very slow and expensive; eventually the ratio of innovative outputs to costs improves; then, another slowdown occurs as a new technology supplants the old. The result is an S-shaped curve, where cumulative innovative inputs are on the horizontal axis and cumulative outputs are on the vertical axis. The rate at which industries pass through the stages of these eras is of course quite variable, but Foster observed that the first phase usually lasts for years—even ten years or more. If Foster is correct, the following hypothesis should be supported:

Hypothesis 2: A recent major technological change in an industry will be negatively related to a firm's innovative efficiency.

Scale and R&D Experience

The question of whether a large or long-lived research effort is especially efficient is without convincing answer so far, suggesting that the issue needs to be looked at with some subtlety. Turning first to the issue of scale, the Schumpeterian hypothesis (summarized in Fisher & Temin, 1973:56) is that there are returns to scale in R&D stemming primarily from indivisibilities and market power in attracting scientists and introducing innovations. But, both Mansfield (1968b) and Scherer (1965) found evidence that, past some point, there are diseconomies of scale in R&D, possibly stemming from rigidities or complacency associated with bigness. Thus, a hypothesis of a curvilinear relationship seems most appropriate:

Hypothesis 3: The relationship between market share and innovative efficiency is curvilinear, with medium-share businesses having the highest innovative efficiency.

Related to the scale of a business is its domain breadth—its range of products and markets—the business-level analogue of diversification. Nelson (1959) argued that diversified firms would reap greater returns from R&D since such firms would be better able to utilize research outputs. A research project may yield something different from what was originally hoped for, and a diverse firm can exploit such serendipity. And, Nelson surmised, diverse firms have more potential arenas in which to apply a broad-gauged product breakthrough. General tests of this notion have yielded inconclusive findings (Grabowski, 1968; Comanor, 1965). However, Kelly (1970), by exploring whether diversification was into technologically related or unrelated areas, found that firms with diverse but technologically related products enjoyed the greatest advantage from R&D. Such a pattern is consistent with Rumelt's (1974) finding that firms perform best if they diversify around some common core of competence.

Since the product line within an individual business unit generally has some common thread running through it, and products would hence qualify as related in Rumelt's (1974) terms, we can state the following proposition:

Hypothesis 4: The relative breadth of product line of a business will be positively related to its innovative efficiency.

The extent and nature of a firm's experience with R&D can be expected to affect the productivity of current R&D. Firms that have had innovative successes will be prompted to attempt even more innovation (Grabowski, 1968), which in turn could be expected to produce further innovative output while honing the firm's innovative adeptness. The consulting firm Booz Allen and Hamilton Inc. (1982:18) has concluded on the basis of its studies that an "innovation experience curve" does exist, in that companies with the most new product experience have the lowest cost of developing and introducing yet more new products. Although their data and methodology are not reported, they state that with each doubling of the number of new products introduced, the cost of introduction declines by 29 percent. Such an argument leads clearly to a hypothesis that success breeds success:

Hypothesis 5: The recent innovation rates of a business relative to those of its competitors will be positively associated with its current innovative efficiency.

R&D experience can also be viewed in terms of its stability and persistence. Miles and Snow (1978) argued that successful execution of a strategy requires a certain persistence that brings all aspects of the organization into line to reinforce that strategy. According to them, a defender (low product innovation) strategy, an analyzer (moderate, me-too innovation) strategy, or a prospector (aggressive, first-in innovation) strategy can each work well in a given environment, but only if all components of the organization—functional policies, asset mix, structure, and processes—are mutually supporting. To develop such coalignments takes time and hence some persistence. In fact, Miles and Snow's only low-performing archetype is the reactor—the business that does not establish a tested repertoire and instead responds opportunistically to environmental events. Further reasons why volatility in R&D activity might be harmful to innovative efficiency are the problems of lab morale, assimilation, team integrity, and uneven leadership (Maidique & Hayes, 1984). Hence, we propose the following hypothesis:

Hypothesis 6: The volatility of R&D spending by a business will be negatively related to its innovative efficiency.

Market Linkages

Several writers have emphasized the importance of close relationships among R&D, marketing, and customers as necessary to product innovation (e.g., Mansfield, Rapoport, Schnee, Wagner, & Hamburger, 1971; Mansfield & Wagner, 1975). In a study of 29 matched pairs of product innovation (half successful, half unsuccessful), Freeman (1973) found that the key distinguishing features were in the areas of market research, user education, and selling. The successful innovations were marked by the firms' in-depth understanding of user needs and the ability to demonstrate the significance of the new product in terms the user would accept.

While achievement of this crucial linkage between R&D and marketing depends on structural features that lay outside the scope of this study, it also depends on other contextual factors that provide the potential for market linkages in the innovation process. First, we expect that forward integration, which amounts to in-house selling and servicing for a business unit, aids in the gathering of market intelligence and the astute introduction of new products.

Hypothesis 7: Forward integration by a business will be positively related to innovative efficiency.

Similarly, businesses that provide a great deal of ongoing service to customers—a task that keeps them on the customer's premises and aware of the customer's problems—will obtain relatively productive R&D efforts:

Hypothesis 8: The degree of auxiliary services provided by a business to its customers will be positively related to innovative efficiency.

A final view of market linkages follows from the work of Williamson (1975), who argued that coordination between two units of the same firm will typically be more efficient than transactions between two separate firms. Thus, to the extent that a business sells to a sister unit in the same firm, market intelligence and customer ties should be fluid and abundant in a way that aids the research effort of the seller unit. However, the buyer unit, which may more likely sell externally, will not necessarily have the same advantages in its own product R&D effort.

Hypothesis 9: The percentage of sales a business derives from within the corporation will be positively related to its innovative efficiency.

Manufacturing Suitability

Theorists have devoted relatively little attention to the linkages between product R&D and manufacturing, even though such ties must be of importance to innovative success. In order to support the innovative process, the plant, equipment, and workers of a business must be flexible and able to economically accommodate disruptions. The lack of previous investigation along this line makes our hypotheses tentative; however, their potential importance to strategists and researchers defends their inclusion.

Fixed asset intensity can typically be expected to create rigidities that hamper innovation. If the production process is highly mechanized, with substantial sunk investments, innovative efficiency could be hurt in any of several ways. First, any serendipitous R&D developments that do not fit squarely with the existing production resources may have to go unexploited. Since a substantial portion of laboratory outputs are such breakthroughs, the penalty for a firm with inflexible production capacity could be substantial. Second, if a firm's production process is extremely capital intensive, any changes or additions to the process that might be required by a new product will involve substantial stakes for proceeding. This in turn means that the firm would shelve innovations with marginal or uncertain prospects whereas

firms having flexible productive resources would not meet such great barriers. Moreover, in the capital intensive firm, since the decision to proceed is relatively significant, it may fall victim to the organization's protocol for making major capital allocations, and thus may involve the traversing of numerous organizational levels, considerable time for approvals, and considerable opportunity for negative decisions (Burgelman, 1983).

Even though we have argued that capital intensity leads to rigidity, this is not always the case. In some industries capital intensity in the form of robots and programmable machinery could be extremely versatile and actually conducive to innovative efficiency (Goldhar & Jelinek, 1983). However, we expect that the opposite pattern will generally hold:

Hypothesis 10: The fixed asset intensity of a business will be negatively related to innovative efficiency.

New plants and equipment will not always equate with flexibility, but we expect that new assets will generally enhance innovative efficiency. Dated assets are often geared to traditional raw materials, product forms, and product aesthetics that often effectively preclude production of new products. Newer assets, on the other hand, may often be designed to accommodate emerging shifts or variations in raw materials and market preferences. This line of reasoning presumes that the design of capital machinery evolves somewhat in response to emerging and anticipated trends confronting the users of the machinery. Research by Sahal (1981) suggests that this is a reasonable presumption.

Hypothesis 11: The newness of fixed assets will be positively related to innovative efficiency.

Worker unionization may also have an effect on innovation. The expected relationship is negative, since union work rules and seniority systems are generally thought to stymie flexibility and adaptation. Alternatively, some recent evidence suggests that the effect of unionization on overall productivity is positive, as it reduces voluntary turnover and conflicts between experienced and inexperienced workers (Freeman & Medoff, 1982). Although it is not clear how such factors could have a salutary effect on innovative efficiency, that possibility serves to limit our conviction in our final hypothesis:

Hypothesis 12: The percentage of workers who are unionized will be negatively related to innovative efficiency in a business.

Organizational Structure and Culture

Many writers have stressed the role of organizational structure and culture in the innovation process. Even though we do not empirically address these factors in this study, their obvious importance requires us to devote a few words to them. Burns and Stalker (1961) first pointed out the role of overall structure and process in accommodating and encouraging product innovation; they spoke of the need for "organic" (1961:37) organizational features. Since then, researchers have identified a vast array of more specific

organizational characteristics as desirable correlates of innovation, such as: lateral communications (Lawrence & Lorsch, 1967); creative bottom-up planning, loose controls, innovation-oriented incentives (Miles & Snow, 1978); a pervasive culture of innovation and a system of new product champions (Peters & Waterman, 1982).

Again, we agree with the theorized importance of such variables, but lacked the data to include them in this study, and so here address only part of the context in which innovation attempts are undertaken.

METHODS

Sample

The data in this study were drawn from the PIMS (Profit Impact of Market Strategies) project, an ongoing, large-scale statistical study of environmental, strategic, and performance variables for individual business units. Each business—often a division—is a distinct product/market unit.¹ The membership rolls of PIMS are confidential, but it is generally known that PIMS members are mostly *Fortune* 500 firms. Thus, the data are not random, a fact with no apparent problematical implications for this study.

Anderson and Paine (1978), who provided a comprehensive critical review of the PIMS data base, acknowledged it to be of high quality. Hambrick, MacMillan, and Day (1982) also noted the lengths taken by PIMS to ensure a high degree of reliability and comparability of responses from member businesses.

This study examined a subsample of 102 PIMS businesses—mature industrial-product firms that had been in the data base for the entire timeframe studied, 1971–76. We did this subsampling because we expected that the study of innovation in consumer-product businesses or growth businesses would require separate treatment. Industrial-product businesses include those producing raw materials, capital goods, components, semifinished assemblies, and supplies. A mature business is one whose primary demand is growing at less than ten percent annually in real terms and whose products are familiar to the majority of prospective users. An additional sampling constraint was that businesses reporting no R & D spending at all were excluded.

Dependent Variables and Lagging Structure

A major difficulty in doing statistical studies of innovation is incorporating the time dimension. It is obvious that the major effects of R & D expenses are delayed—effects occur in later periods than expenses—moreover, these effects are spread over multiple periods. A distributed lag analysis is an appropriate, though not ideal, way of addressing this problem. The nature of the R & D output variable—the percent of sales derived from the new products introduced over the past three years—hampered use of such an analysis

¹For a technical summary of the PIMS data base, see Schoeffler, 1977.

for this study. If the score of a business on this dimension changes from one year to the next, there is no way to know whether to attribute the change to products introduced in period t , $t-1$, or $t-2$. In the face of this problem, any year-by-year lag analysis creates a false impression of precision and raises more statistical noise than it eliminates.

Our approach was to conceive of broader pools of R&D spending and new product outputs. Specifically, we calculated the average R&D intensity—product R&D expenses as a percent of sales—for the first four years of the timeframe and sought the association of that R&D spending with the average new product sales in the last two years of the timeframe. Thus, for our 1971–76 timeframe, we constructed R&D inputs (RDIN) as the simple average of R&D intensity in 1971, 1972, 1973, and 1974. New product outputs (NPOUT) is the simple average of new product sales as a percent of total sales for 1975 and 1976.

Such an approach pretends to no universal applicability, nor can it possibly capture the myriad time lags that can occur. However, this lagging structure is defensible for this sample on three grounds. First, for this sample, the simple correlations between R&D spending and new products were strongest (around .30) with lags of two and three years—roughly the midpoint of our lagged R&D pool. One-year and four-year lags had lower, but still significant, correlations with new product sales, thus supporting their inclusion in the R&D pool. This pattern is not inconsistent with the somewhat longer five-year peak lag between R&D spending and profitability observed by Ravenscraft and Scherer (1982) in another PIMS sample. Taken together, then, these studies suggest that the peak lag between new product introductions and profitability is about two to three years for the average PIMS business, a potentially interesting observation in itself.

Second, the seemingly short time lag between R&D inputs and outputs is supported in part because we can assume the innovative activities being examined are, by virtue of being done in business units, relatively applied and closer to fruition than the more basic research usually done in corporate-level labs. Some evidence to this effect provides the third defense. Mansfield and Brandenburg (1966), in a study of 68 research projects conducted in a firm, found that those projects requested by existing divisions, in contrast to those aimed at developing wholly new businesses, had a median of 2.2 years elapsing from start to estimated completion of a project. And, for the same projects, the median lapse between technical completion of the project and commercialization was less than six months. Although this evidence supports the validity of the lagging structure we chose, it remains clear that our assignment of R&D inputs to new product outputs is far from precise.

Another source of measurement error is that new products vary greatly as to how new and radical they are. There does not seem any easy way to cope with this problem, although we should note that PIMS instructions to respondents carefully define new products, product modifications, and product extensions. Still, the lack of uniformity in the new products undertaken by the businesses is another source of measurement error, placing a further

downward bias on our predictive model.

Because our interest focuses on the factors associated with innovative efficiency and not simply innovation rates, we used three different measurements for the dependent construct of innovative efficiency to test the robustness of our findings. First, we used new product outputs (*NPOUT*) as the dependent variable and included R&D inputs (*RDIN*) as a control variable in the model.

The second approach, which we call innovative efficiency (*IE*), was to use as the dependent variable the residual after regressing R&D inputs on new product outputs, with the following results:

$$\begin{aligned}NPOUT &= a + b(RDIN) + IE, \\NPOUT &= 2.85 + 2.02(RDIN) + IE, \\(R^2 &= .20; F = 26.1; p < .001).\end{aligned}$$

For example, a business that had spent an average of 1.0 percent of sales on product R&D between 1971 and 1974 (*RDIN*) would have an expected new product sales rate in 1975–76 of 4.87 ($2.85 + 2.02 \times 1.0$). If its actual new product sales rate (*NPOUT*) were 8 percent, its innovative efficiency would be 3.13 ($8 - 4.87$). This approach allows R&D inputs to absorb its full influence on new product outputs, thus allowing us to fully account for the extent to which new product outputs simply represent the firm's R & D dollar inputs.

We termed our third measurement innovative efficiency percentage (*IE%*) and calculated it as innovative efficiency (*IE*) divided by the amount of new products that would be expected on the basis of R&D inputs alone. The business in the above example would have an innovative efficiency percentage of 64 percent ($3.13/4.87$). This approach meets the criticism that innovative efficiency needs to be examined in terms of relative magnitude—that a business with 6 percent new product sales instead of an expected 3 percent is proportionately far more efficient than a business with 26 percent instead of an expected 23 percent.

These three variations in measuring the dependent variable differ only subtly; each has its strengths and limitations. Observing the results obtained from all three helps establish the stability and strength of any findings.

Independent Variables

The independent variables are defined in the Appendix and listed in Table 1, along with means, standard deviations, and intercorrelations. For all but two of these, we used four-year (1971–74) averages. In the case of industry innovation and relative new products, we used only the 1971 figure, since the figure for any later year could include sales from new products that were still counted as new products in our years of new product outputs, 1975–76. (Recall that a product is new if it was introduced in the focal year or the prior two years.)

TABLE 1
Means, Standard Deviations, and Intercorrelations of Variables^a

Variables	Means	s.d.	Correlations														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. R&D inputs	1.99	2.42	—														
2. New product outputs	7.88	12.95	.40	—													
3. Innovative efficiency	.39	7.88	.00	.02	—												
4. Innovative efficiency %	.02	.32	.00	.01	.02	—											
5. Industry new product sales	6.92	10.07	.07	.29	.37	.29	—										
6. Recent major technological change	.22	.42	.28	.07	-.06	-.02	.02	—									
7. Market share	48.12	42.72	.19	.04	-.13	-.08	-.19	-.12	—								
8. Relative product line breadth	2.14	.78	-.07	.12	.17	.14	-.17	-.22	.30	—							
9. Relative innovative experience	2.79	14.34	.28	.29	.38	.20	-.18	.13	.05	.05	—						
10. Volatility of R&D	1.80	2.93	-.10	-.07	-.01	-.14	.15	.14	-.25	-.21	.14	—					
11. Forward integration	1.94	.56	.17	.23	.20	.12	.15	.15	.19	.17	.03	.00	—				
12. Auxiliary service	1.23	.75	.19	.22	.08	.04	.12	.21	.06	.11	.15	.06	.06	—			
13. Interdivisional sales	6.98	12.03	-.02	.06	.13	.10	.12	.00	.06	.08	-.16	-.08	.26	-.25	—		
14. Unionization rate	48.38	31.82	-.22	-.25	-.14	-.13	-.07	-.07	.02	.01	-.25	-.01	-.02	-.24	.06	—	
15. Capital intensity	95.49	70.18	-.09	-.17	-.24	-.18	-.11	-.07	.10	.06	-.28	-.10	-.02	-.20	.13	.24	—
16. Newness of plant and equipment	52.41	14.40	-.12	.14	.24	.26	.19	-.02	-.09	.08	.04	.17	-.11	.19	-.17	-.24	-.10

^an = 102; critical r levels: p < .10 = .16, p < .05 = .20, p < .01 = .25.

Data Analysis

All the independent variables discussed above were included in a multiple regression on each of the three dependent variables. In the case of new product outputs as a dependent variable, we included R&D inputs as a control variable. Intercorrelations among the independent variables were all below $\pm .30$ —low enough to avoid unstable beta coefficients.

RESULTS AND DISCUSSION

The overall regression results, summarized in Table 2, are highly significant and strongly and consistently support several of the hypotheses. The discussion that follows will treat each of the categories of independent variables in turn and will conclude with a synthesis of the results.

TABLE 2
Multiple Regression Results Predicting
Three Indicators of Innovative Efficiency^a

Independent Variables	Expected Sign	Dependent Variables		
		New Product Outputs	Innovative Efficiency	Innovative Efficiency %
Technological opportunity				
Industry new product sales (1971)	+	.33***	.37***	.33***
Recent major technological change	—	-.09	-.15***	-.05
Scale and R&D experience				
Market share	\wedge^b	-.15***	-.23***	-.13*
Relative product line breadth	+	.19***	.24**	.13*
Relative innovative experience (1971)	+	.39***	.43***	.13*
Volatility of R&D	—	-.03	-.02	-.12*
Market linkages				
Forward integration	+	.10*	.11*	.03
Auxiliary services	+	.03	-.02	.02
Interdivisional sales	+	.11*	.12*	.07
Manufacturing suitability				
Unionization rate	—	.00	.03	-.06
Capital intensity	—	-.07	-.08	-.02
Newness of plant and equipment	+	.08	.11*	.15*
R&D inputs (control)		.30***		
R ²		.65***	.53***	.31***

^aStandardized coefficients are reported.

^bCurvilinear relationship expected.

* $p < .10$

** $p < .05$

*** $p < .01$

Technological Opportunity

The results strongly support the idea that innovative efficiency is in part a function of the degree of technological opportunity faced by a business. The first indication is that an industry's rate of new product sales in 1971 was a significant positive predictor of all three measures of innovative efficiency in 1975–76. The predictor variable in this case is an indicator of how prone the product category is to technological innovation and how prone the market is to innovative acceptance. For example, within our sample of mature industrial-product industries, something like the textile machinery industry would score high on technological opportunity, and the coated abrasives industry would score low. It may be important to reiterate that the dependent variables are not simply measures of innovative output but, rather, were constructed to measure the relationship between innovative inputs and outputs; i.e., to measure innovative efficiency. As with farming or mining, innovative efficiency depends on the fertility or untapped resources of the terrain being worked.

Yet, the results for one of our indicators suggest that if a recent technological change has occurred in the industry, innovative efficiency is penalized. As Foster (1982) argued, exploiting a new technology involves such extraordinary amounts of learning, start-up costs, and errors that payoffs can be discouragingly expensive. This is not to say that firms should not undertake such efforts, but rather that they will be relatively inefficient in the short run. As will be seen from later results, there appear to be counterbalancing rewards to businesses that achieve a level of early technological experience beyond that of their competitors.

Scale and Experience

Results in part supported the hypotheses dealing with scale and experience, but perhaps the most noteworthy result was a strong negative relationship between market share and innovative efficiency. We hypothesized that the relationship between market share and innovative efficiency would be curvilinear, with medium-share businesses doing best. To test for such curvilinearity we ran regressions once with market share and market share squared both included, and once with market share only. The regressions with the squared term did not significantly improve the R^2 s, indicating no curvilinear effects. The regressions reported here are the ones without the squared term, and, as Table 2 shows, market share has a negative association with all three measures of innovative efficiency.

The use of market share as an indicator of size prevents any assessment of the linkage between absolute scale and innovative efficiency. Unfortunately, for security reasons, data on absolute size are not available in the PIMS data base. However, there is no reason to expect the average market sizes of small-share and large-share businesses to be systematically different. So, we can assume that on the average the small-share businesses are absolutely smaller than the large-share businesses in the data set. Regrettably, there is

no way of knowing from the data whether the downward pressure on innovative efficiency stems from disadvantages due to absolute size, to market share, or to both.

Since to our knowledge this is the only study to yield such a negative relationship, some reconciliation with past studies and prevailing theory is in order. One explanation may lie in the fact that this is the only study we know about that examines R&D returns-to-scale using a measure of innovative efficiency—instead of simple innovative output—as the dependent variable. It may be, for instance, that innovative output is positively related to firm size, but that there are inefficiencies associated with bigness that cause innovative outputs to be relatively expensive. A partial test for this explanation is to examine the correlations between market share and the components making up the innovative efficiency measure—R&D inputs (*RDIN*) and new product outputs (*NPOUT*). The correlation between market share and R&D inputs was .19 ($p < .10$), and between market share and new product outputs it was .04 (*n.s.*), suggesting that large scale businesses spend relatively heavily on R&D but that the outputs, at least as measured by new product sales, are not commensurately high. Another interpretation may be that large-scale businesses undertake fairly risky projects with long time lags that the six-year timeframe of this study did not adequately reflect.

Also relevant is the fact that this study looked at new product sales rather than the patent statistics used by most previous researchers of R&D returns-to-scale. It may be that large-share firms are especially likely to seek patents on their innovative outputs. This seems improbable in the face of contrary results by Comanor and Scherer (1969) indicating that large firms are the businesses least likely to obtain patents, since they can protect their innovations by the sheer scale of their technological resources and their market power. Still, the gulf between patents and new product sales may account in part for the contrast between this study and previous ones on the issue of the effects of scale.

The possibility that there are genuine innovative inefficiencies associated with size should not be discounted (U.S. Government Printing Office, 1983). Cooper concluded in an early study of the electronics industry that, “a large company typically spends from three to ten times as much as a small one to develop a particular product” (1964:76). He attributed this disparity to three possible causes. First, bureaucratic momentum, rigidities, and complexity of information flows often place a sharp penalty on innovative efficiency in a large firm. Second, he concluded that small firms are better able to attract topflight engineers who are drawn to the excitement of an intimate, high-visibility research endeavor. Finally, he observed that large firms, which may have more slack resources than small firms (Cyert & March, 1963), are simply not under pressure to strive for efficiency the way a small firm must. In this vein, Biggadike (1976) found that a sample of successful new ventures started within large corporations took an average of seven years to become profitable, whereas Fast (1981) found that a sample of successful new ventures started by individual entrepreneurs reached profitabil-

ity in an average of four years. Fast attributed the gap between the two samples to the relative inhospitability of large firms toward innovation and to their lack of pressure for prompt results.

No single explanation can possibly account for the consistently negative relationships observed in this study between market share and innovative efficiency. Adequate explanation will require additional tests and possibly theoretical perspectives lying outside the scope of this project.

As hypothesized, product-line breadth was positively associated with all the measures of innovative efficiency. A broad product line gives a firm enough possible outlets and applications so that few innovative developments go unused, and some developments can be used in many ways. It is important to emphasize that, since this study deals with business units, all items in a product line will tend to be related in terms of their technology or their market—so these findings do not support the possibility of R&D economies in conglomerate firms.

Since the correlation between market share and product-line breadth was higher (.30) than for any other pair of independent variables, we tested the regression for stability by running it two more times and alternately excluding each of these two intertwined variables. In each case, the included variable retained its sign and significance, indicating that the intercorrelation was not distorting the patterns observed.

As hypothesized, the degree of relative innovative experience of a business—as measured by its 1971 level of product sales relative to its competitors—was positively related to innovative efficiency in 1975–76. An apparent payoff of innovative experience is that it drives down the cost of later innovative attempts. As Booz Allen and Hamilton Inc. (1982) argued, learning occurs on several fronts: selecting projects, managing projects, doing market tests, and so on. Firms whose innovative activity surpasses their competitors' appear to enjoy a favorable ratio of innovative outputs to inputs in subsequent attempts.

The final dimension of innovative experience examined was R&D volatility. We hypothesized that firms with volatile R&D expenditures would have relatively inefficient innovation programs. The only significant result observed was for innovative efficiency percentage (IE%); the sign was negative, as hypothesized, but only at the .10 level. The lack of any stronger results possibly suggests that the negative effects of volatile R&D—poor morale, lack of continuity, poor lab control systems—are often offset by the cost advantages of a firm's cutting back when attractive projects are not imminent and gearing up only when particularly promising opportunities present themselves.

Market Linkages

Results moderately supported the hypotheses regarding a firm's linkages to its markets and customers. There was a slight positive relationship (at the .10 level) between forward integration and two indicators of innovative efficiency, suggesting that businesses that do their own selling and servicing

enjoy some benefits from their closeness to customers which do not accrue to businesses that turn their products over to distributors or agents. It may be important to repeat that, at the business level, forward integration—as measured here—typically refers to capturing value in such activities as selling, servicing, warehousing, and distribution, as opposed to further physical conversion of the product itself.

The hypothesis that there would be positive effects from providing auxiliary services to customers was not supported. We reasoned that by providing ongoing product servicing to customers, a business could stay relatively well-informed about customers' problems and could convert that awareness into relatively efficient product innovation. The lack of any relationship may highlight the implications of studying only the context of innovation rather than the process itself. It may be that such firms have the potential to convert their service activities into useful market-intelligence gathering, but that in general they do not attempt to do so, or are not successful at such attempts. After all, the service representatives themselves may not have the aptitude for seeing what implications their observations have for product innovation; they may even be threatened by the possibility of product innovations. These are speculative possibilities, but they indicate how a seemingly conducive context for innovation can fall short of its potential unless a firm's processes—structure, personnel selection and training, rewards, etc.—are suited to capitalize on and accentuate the context.

The final hypothesis dealing with market linkages posited that businesses that sell to sister units within the same corporation would experience favorable innovative efficiency. The hypothesis received modest support (at the .10 level) for two of the measures, innovative efficiency and percentage of innovative efficiency, suggesting that there may be relatively fluid and abundant communications between sister units that serve the innovative effort of the seller unit. At a general level, Williamson (1975) argued for the efficiency of internal markets, and, at a more specific level, Harrigan (1983) argued for the benefits of vertical integration to market intelligence. The present study provides one of the few pieces of concrete evidence of a specific way in which these benefits might accrue.

Manufacturing Suitability

The final set of hypotheses dealing with the effects of manufacturing suitability on innovative efficiency were only marginally supported. There was, as hypothesized, a modest positive relationship ($p < .10$) between newness of plant and equipment and innovative efficiency (IE and IE%), possibly supporting the idea that up-to-date assets are important to successful launching of new products. However, an equally plausible argument is that as soon as a firm senses that it will have a successful new product, it invests in new assets to produce that product.

The negative relationship between fixed asset intensity and innovative efficiency was in the expected direction, but not statistically significant. Apparently, capital intensity does not consistently equate with rigidity. In

fact, in more and more industries, one might suppose that capital intensity in the form of robots and programmable machinery could be extremely versatile and hence conducive to innovative efficiency. It is important to know the type of fixed assets employed in order to infer any effect—positive or negative—on innovation. An additional complication in interpreting the result is the possibility that innovative businesses will tend to have relatively new fixed assets, purchased at the most recent prices and relatively undepreciated, that create the impression that the businesses are very capital intensive.

Finally, unionization was not related to innovative efficiency. We reasoned that unionized workforces would be relatively inflexible and would cause downward pressure on innovative efficiency, but apparently that is not the case. As Chamberlain, Cullen, and Lewin (1980) argued, it may be that unions generally accept new technology. Or it may be that unions are more resistant to new processes than to new products.

Synthesis

This study of the factors affecting innovative efficiency at the business level has corroborated the observations of some previous investigators and has brought to light new evidence. Innovative efficiency appears to be aided by the following contextual conditions, (1) abundant technological opportunity in the product category, with no recent major technological change in the product category; (2) small market share, broad product line, and innovative experience beyond that of the competition; (3) forward integration and sales to sister units within the corporation; and (4) new plant and equipment. All of these factors were subsumed under the broad concepts of technological opportunity, scale and experience, market linkages, and manufacturing suitability. With the exception of the finding for market share, all the above patterns were in the direction hypothesized.

From the perspective of the strategist, it may be particularly discouraging to observe the almost ecological nature of the results. Innovative efficiency appears to be strongly associated with the factors that are beyond a firm's control. That is, there is little a firm can do about industry innovation rates or existence of major technological changes in its industry, and little it can do in the short term about market share or relative degree of innovative experience. The factors over which a firm does have control are (1) product-line breadth, (2) R&D budget stability, (3) forward integration, (4) internal sales, (5) and plant equipment newness. It appears that a firm may have to draw upon these factors in the short term to establish the R&D momentum that will, in turn, lead to innovative experience and an eventually efficient innovation effort. As they so often must, strategists need to take the long view.

CONCLUSION AND LIMITATIONS

Although this study has somewhat advanced our understanding of the factors that promote the conversion of R&D expenditures into new product

sales, it is clear that much more research needs to be done on the topic. The study has three features that should be recapped in order to clarify its focus. First, the study examines the context in which innovative attempts are undertaken, in contrast to the process by which they are undertaken. We reasoned—and found—that industry and firm characteristics, quite aside from how innovation is managed, have pronounced effects on innovative efficiency. The second feature of the study is its focus on innovation in business units rather than in overall corporations. With the continuing trend toward corporate diversity and decentralized innovation efforts, it seems important for researchers to direct more of their inquiry into innovation at the discrete business level. A third feature of the study is its focus on innovative efficiency—the relationship between innovation inputs and outputs—rather than on innovative outputs alone. Most previous studies have examined innovative outputs like patents or new product sales, and their results, although instructive, have had only limited implications for managers, since they gave no insight into benefits as opposed to cost. Future studies of innovation should try to address and refine the inputs-versus-outputs relationship.

The present study has several important limitations that serve to temper our findings as well as to provide obvious opportunities for future research. The first limitation is that causality has not been established. The lagged data structure improves our confidence about the sequence in which innovative events occur, but strict testing for causality has not been conducted and therefore cannot be assumed.

A second limitation is that the six-year timeframe of the study was inadequate for observing the outcomes of some long-lagged innovative efforts. Also, the lagging structure for matching innovative inputs to outputs was fairly crude, although it was appropriate given the nature and quantity of data available. As PIMS accumulates data on more years, longer lags and more sophisticated lagging structures can be examined.

A third limitation is that the study stops short of examining the profitability of innovations. By using new product sales as its output measure, the study addresses what might be termed intermediate innovative outputs. Such outputs may or may not be precursors of later profits, so the real economics of innovation have not been addressed by the study. To do so would take a much larger sample and a longer time period, since so many factors other than innovation affect profitability, and whatever effects there are can take a long time to observe in their entirety.

Despite its limitations, the study sheds light on the contextual factors which promote innovative efficiency. Technological opportunity, scale and experience, market linkages, and manufacturing suitability all appear to have some bearing on the degree to which R&D expenses result in near-term new product sales. Future research should use other samples, measures, and lagging structures to test the robustness and causality of these preliminary patterns.

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APPENDIX

Definitions of Independent Variables

All the variables are drawn from the PIMS data set.² Respondents to the questionnaire are typically upper-middle line and staff executives within the firms. See Schoeffler (1977) for details on the data set.

Industry new product sales (1971): The percentage of sales the three largest competitors derive from new products (introduced within the past three years).

Recent major technological change: "Have there been major technological changes in the products offered by the business or its major competitors during the last eight years?" (0 = no, 1 = yes).

Market share: The market share of the business divided by the total shares of the three largest competitors.

Relative product line breadth: "Relative to the weighted average of the product lines of the three largest competitors, estimate the breadth of the product line of this business" (1 = narrower, 2 = same, 3 = broader).

Relative innovative experience (1971): The percent of sales the business derives from new products minus the percent of sales the three largest competitors derive from new products.

Volatility of R&D: The sum of errors from a four-year least-squares fitting of R&D/sales.

Forward integration: "Compare the degree of forward integration of this business relative to its three largest competitors" (1 = less, 2 = same, 3 = more).

Auxiliary services: "Are installation, repair, customer education, and other product-related services provided to end users . . . ?" (1 = of relatively little or no importance, 2 = of some importance, 3 = of great importance).

Interdivisional sales: "Approximately what percent of total sales of this business are made to other components of the same corporation?"

Unionization rate: The percentage of all employees covered by collective bargaining agreements.

Capital intensity: Gross book value of all fixed assets divided by revenues.

Plant and equipment newness: Net book value of fixed assets divided by gross book value of fixed assets.

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²All are four year averages, 1971–74, except where noted.

STRATEGIC GOALS, PERCEIVED UNCERTAINTY, AND ECONOMIC PERFORMANCE IN VOLATILE ENVIRONMENTS

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An untested proposition in the normative strategic management literature is that strategists should make decisions based on accurate assessments of their external environments. Empirical organization theory literature holds the assumption that high levels of perceived uncertainty are detrimental to performance. Both literatures assume goal consensus to be important to effectiveness. This study investigated the relationship between top management perceptions of uncertainty, corporate goal structures, and industry volatility in explaining economic performance in 20 firms. Findings suggested that attempts to avoid true environmental uncertainty and to seek high levels of goal congruence may be dysfunctional.

Strategic management is the province of organizational elites, and the way in which the members of these elites—senior executives—perceive and act upon their firms' external environments plays a large role in corporate conduct and performance. Strategic management and organization theory provide two academic perspectives on how this performance is achieved (Bourgeois & Astley, 1979), and each perspective is based upon a certain set of assumptions. The following study challenges some of those assumptions.

The central tenet in strategic management is that a match between environmental conditions and organizational capabilities and resources is critical to performance, and that a strategist's job is to find or create this match. This theme pervades the two literatures that are antecedent to the field. First, traditional business policy literature advanced the notion that success is a function of the degree of strategic fit between environmental trends ("threats and opportunities") and an organization's distinctive competence ("strengths and weaknesses") (Andrews, 1971: 59–60). The more recent perspective adopted from industrial organization economics has a similar orientation, whereby industry structure constrains firm conduct, which determines economic performance (Hatten, Schendel, & Cooper, 1978).

The organization theory literature has advanced a strikingly similar match or fit notion in the contingency theory paradigm. Empirical researchers like Burns and Stalker (1961) and Lawrence and Lorsch (1967) suggested that effectiveness derives from structuring an administrative arrangement appropriate to the nature of an organization's external environment. In essence,

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flexible, organic styles and structures befit turbulent, uncertain environments, and bureaucratic, mechanistic styles are appropriate for stable, predictable environments. The suggested causal sequence is environment determining organization, which determines effectiveness. The concept analogous to strategic management's match is Thompson's notion of coalignment, according to which the key to effective management is an organization's continuous adaptation to external conditions. Thompson likened this strategic, senior administrative task to "shooting at a moving target" (Thompson, 1967: 148).

Although both fields seem to be converging with their mutual focus on coalignment, their research traditions differ. First, they differ in how they operationally define their variables. Strategic management scholars have tended to look at environment-organization coalignment in terms of competitive market structure and firm strategies (or strategy "content"), respectively, often bypassing the human processes producing those strategies. Organization theorists, on the other hand, have viewed this coalignment in terms of environmental attributes of change, complexity, or uncertainty, and in terms of organizational attributes of formal structure, goal orientations, and decision styles. Since the latter group has relied primarily on perceptual measures taken from mid- to lower-level organizational participants (Dewar & Werbel, 1979; Duncan, 1972; Pennings, 1975), it could be said that neither field has examined the coalignment directly from the perspective of top management.

A second difference in the two research traditions pertains to theoretical grounding. As a relatively new academic field whose foundations are practical rather than theoretical, strategic management has produced very little hypothesis-testing research. Instead, investigators have tended to comb data bases in search of patterns of relationships among large numbers of variables (e.g., Buzzel, Gale, & Sultan, 1975; Hatten et al., 1978). Although the number of investigations is growing, theoretical formulations derived from these investigations are still wanting—scholars have not yet provided generalized principles that would predict which combinations of, or fit between, specific environmental and strategic attributes are theoretically most viable. In contrast, contingency theory makes somewhat clearer relational statements, like the one in the second paragraph of this paper, and since Lawrence and Lorsch (1967), has generated a large amount of hypothesis-testing research. The fact that many of these studies fail to support contingency hypotheses is a thorny issue addressed by several authors (Argote, 1982; Dewar & Werbel, 1979; Schoonhoven, 1981).

The present study followed a path between these two research traditions. First, it examined coalignment from the perspective of top management teams, measuring the perceptions of senior executives—not strategy content, not organization structures, not perceptions of lower-level actors. Second, it treated external environment as an objectively measured, industry attribute—not as a set of perceptions about the environment. Top management perceptions were instead treated as part of the strategy-making process. Third, it put forth hypotheses to guide the exploration of empirical relationships

among environment, strategy process, and performance variables, relationships that have strong normative acceptance among academics but only weak theoretical underpinnings. Finally, it attempted to infer a model of strategic performance from empirical patterns present in the data.

WORKING HYPOTHESES

In any exploratory study, especially in a field like strategic management that has little received theory, a researcher often works from hunches—about which variables are important, how they might be related, and so forth—or, alternatively, looks to a second field, such as contingency theory, for theoretical guidance. But, as Schoonhoven points out, “contingency theory is not a theory at all. . . . It is more an orienting strategy or metatheory” (1981: 350). So, to orient this exploration I formulated a set of contingency-flavored working hypotheses that would serve to focus data gathering, analysis, and subsequent inferences. These hypotheses were grounded, whenever possible, in previous research. Often, however, they derived from either logic or common sense prescriptions prevalent in the planning and business policy literatures.

Environmental Perceptions: Accuracy and Consensus

Several writers have recognized environmental scanning and perception as key to the strategy-making process (Aguilar, 1967; Anderson & Paine, 1975; Andrews, 1971; Bourgeois, 1980a; Hambrick, 1982; Uytterhoeven, Ackerman, & Rosenblum, 1977); others have studied the effects of perceived environmental states on perceptions of uncertainty (Downey & Slocum, 1975; Duncan, 1972). Only a few had concerned themselves with the perceptions of strategy-level executives (Khandwalla, 1976; Paine & Anderson, 1977) and even fewer have explicitly suggested the importance of the accuracy of these perceptions to economic performance (Hatten & Schendel, 1975).

Some studies have shown that managers' perceptions are only weakly related to objective measures of their environments (Lorenzi, Sims, & Slocum, 1979; Tosi, Aldag, & Storey, 1973). For example, Tosi and his colleagues compared managers' responses on Lawrence and Lorsch's (1967) perceived uncertainty scale to actual variability in respondents' industries and found no significant correlations. The critical assumption in these studies was that managers' perceptions do, in fact, reflect actual environmental conditions, and that failure to capture this reflection faulted the validity of the instruments, rather than the fidelity of managers' perceptions (cf. Tosi et al., 1973; Downey, Hellriegel, & Slocum, 1975). Other researchers have made the assumption that uncertainty per se will hurt a manager's performance (Lorenzi et al., 1979), although empirical results supporting this view are equivocal (Downey & Slocum, 1982).

There is no research that (1) compares top managements' perceptions of environmental uncertainty to objectively measured environmental volatility,

and (2) links this perceived-versus-objective match to their firms' economic performance. This study does both by entertaining the following hypothesis:

Hypothesis 1: The greater the match between true environmental volatility and managers' perceived environmental uncertainty, the higher the economic performance of a firm.

Thus, it was anticipated that congruence between actual volatility in a firm's task environment and top management's perception of that volatility would be associated with higher economic performance than would be the case in the absence of such congruence. The rationale was that if environmental scanning is an important part of strategy making, then, to the extent that resulting perceptions accurately reflect the objective situation, strategists minimize the costs of acting on faulty information. As Snow pointed out, firms act upon and respond to an environment that their top managements have perceived and interpreted: "That is, management responds only to what it perceives; those environmental conditions that are not noticed do not affect management's decisions and actions. This . . . means that the same 'objective' environment may appear differently to different organizations," possibly resulting in different strategies (1976: 249).

Snow's comments suggest that different top management teams can perceive the same objective environment differently, which would explain why firms facing ostensibly similar conditions pursue different strategies and, by implication, achieve different performance levels.¹

What Snow, or any other organization theorist, has not stated explicitly is that there may be some environmental conditions that all firms should perceive accurately and apprehend if they are to survive. This is particularly true concerning environmental shocks or discontinuities—for instance, rapid industry shakeouts, technological breakthroughs, or events like the 1973 oil embargo. Because of the strategic importance of discontinuity, this study looks at one key attribute of environment—volatility—and its interaction with top executives' perceptions of uncertainty.

Although the congruence hypothesis has never been subjected to empirical testing, the normative literature has tended to accept its implications as an article of faith. A statement such as Hatten and Schendel's is representative: "In theory, the worth of a strategy depends on management's ability to . . . identify and to evaluate correctly discontinuities in the environment" (1975: 196). The fact that two organizations acting in the same environment can perceive it quite differently, which Starbuck termed "perceptual relativity" (1976: 1080), should have some differential relationship to performance.

Hypothesis 2: The greater the homogeneity of perceived environmental uncertainty within a top management team, the greater the economic performance of a firm.

¹It would also explain why Tosi and colleagues' (1973) attempt to validate a perceived environment instrument against objective industry indices failed.

Here, my expectation was that in a firm whose management views its environment with a single eye—that is, where there is low variance in perceptions within the top management team—the various subsystems of the firm that these executives represent will act upon uniform perceptions of the objective external situation. Harmony in environmental perceptions was thus expected to be associated with high performance.

Unlike Hypothesis 1, this is not a contingency hypothesis. It predicts performance as a function of perceptual homogeneity within firms, independent of the magnitude of perceived uncertainty or level of volatility. The logic instead rests on the value of consensus. The normative planning and decision-making literatures usually prescribe consensus on goals (see next hypothesis), with the implication that this will lead to coordinated strategies and, ultimately, higher performance (Bourgeois, 1980b). However, top management teams may consist of individuals who perceive the environment differently; to the extent that they interact to produce strategic decisions, they must share differing information, opinions, and perceptions. If such interaction leads to consensus—and, presumably, coordinated and effective strategies—they should have hammered out differences in opinions and perceptions. This process should be reflected in both high economic performance and a low diversity in perceptions of environmental uncertainty within the top management team.

Strategic Goals: Consensus and Quantity

A suggested result of the strategy development process just described is a homogenization of perceptions. This homogenization is a byproduct of the quest for goal consensus, which is hypothesized to be critical to economic performance:

Hypothesis 3: The greater the goal consensus within the top management team, the greater the economic performance of the firm.

Goal consensus should be positively associated with economic performance. This statement, which assumes that single-mindedness in purpose leads to higher performance, follows directly from the normative literature suggesting that firms articulate corporate objectives before searching for alternative ways to attain them. After studying 82 British firms, Child derived a similar proposition—"The less dispersed top management objectives are and the more agreement there is among senior managers as to which objectives have priority, the more successful the organization will be in attaining them" (1974: 9)—but he was unable to test it, since he obtained only chief executives' evaluations.

Hypotheses 2 and 3 have a universal quality; that is, relationships were expected to hold regardless of whether an environment was volatile or stable. In contrast, like Hypothesis 1, the next hypothesis takes a contingency view:

Hypothesis 4: The greater the positive association between environmental volatility and the number of strategic objectives, the higher the economic performance.

A large number of goals should be associated with high performance in volatile environments, as will a small number in stable environments. The logic for this hypothesis is derived from the notion of coalignment. For example, in their discussion of goals in corporations facing unstable environments, Thompson and McEwen (1958) suggested that effective firms manage adaptation by continually reappraising their goals; during reappraisal, new goals are articulated and added to the old. However, owing to previous political commitments, organizational inertia, or corporate culture, old goals linger for a time before new goals entirely displace them (Quinn, 1977). It then follows that, to the extent that firms in more volatile environments create new goals, because they also retain some old goals, they will tend to have longer lists of important goals at any given time than will firms in stable environments. Since new goals reflect recognition of a need to adapt to a changing environment, for firms in volatile environments a relatively high number of goals will reflect successful adaptation.

Conversely, firms in stable environments should experience less need to change their goal structures to remain successful. Pursuit of too many goals in stable environments might lead firms in more directions than conditions warrant, result in inefficient use of resources, and hence, depress economic performance.

Also, since volatility increases risk, firms may be able to reduce risk by subjecting strategic alternatives to a large set of goal hurdles, thus reducing the likelihood of hasty commitment of resources to a particular course of action. Carter suggested this argument after studying a business strategy decision that concerned capital investment in computer terminals, stating that "the greater the uncertainty of outcome in the total environment of the organization, the greater the number of criteria, that is, goals, which will be sought to guide the strategic decisions" (1971: 423).

DATA COLLECTION METHODS

Interviews, questionnaires, and secondary data sources (industry statistics and annual reports) were combined to measure variables. The investigation was conducted among 20 nondiversified public corporations headquartered in the Pacific Northwest; the single-business focus of all firms assured that each executive would be responding to uncertainty in only one industry. Although the firms fell into 17 different three-digit Standard Industrial Classifications, they represented three broad categories of commercial activity: there were 11 service firms (retailers, wholesalers, and transporters), 4 high technology (R & D) firms, and 5 manufacturers.

Initial interviews with chief executive officers (CEOs) provided background on firms' strategies and helped identify members of their top management teams. Usually, membership in a top management team corresponded to officer status in a firm. The size of these teams, which varied across firms, may reflect the extent to which each CEO shared power. Questionnaires

were sent to all identified top management team members and CEOs; of 106 questionnaires sent, 99 usable responses, or 93 percent, came back. Sixteen of the 20 firms provided a 100 percent return.

Table 1 gives characteristics and response rates of participating firms.² The sample included two recent turnaround efforts (Ret-1 and Ret-5), a new venture with negative net worth (R&D-2), and a failing firm undergoing bankruptcy proceedings (Mfg-5), a variety that assured a wide variance in the financial performance index, described in the next section.

THE VARIABLES: OPERATIONAL DEFINITIONS

Environmental Volatility

Previous studies of task environments usually identified two attributes: (1) dynamism, or degree of change or variability, and (2) complexity, or number and diversity of environmental factors interacting with an organization. Empirical research has shown that degree of change explains more variance in perceived uncertainty than does complexity at the business level of strategy making (Bourgeois, 1980a; Duncan, 1972; Lindsay & Rue, 1980; Lorenzi et al., 1979). Also, strategists would argue that unpredictable discontinuities, as opposed to complexity, in an environment create the most risk and difficulty for effective strategy making. Therefore, I focused on discontinuity—or volatility—as the key task environment attribute in this study.

A firm's task environment includes five external components: customers, competitors, suppliers, regulatory groups, and technological requirements of an industry (Dill, 1958; Duncan, 1972). Since industry and task environment tap similar dimensions of a firm's objective environment, I measured volatility by using available measures of industry characteristics. The literature is fairly consistent in suggesting that the most appropriate industry characteristics for measuring an environment are its product-market and technological characteristics (Beard, 1978; Burns & Stalker, 1961; Child, 1974; Tosi et al., 1973).

To date, Tosi and his colleagues (1973) have made the most notable attempt at an objective measure of volatility using industry statistics for both market and technological change; in that study, they computed variability of industry sales, variability of profits before taxes, and technological volatility, using the coefficient of variation (standard deviation divided by the mean) over ten years for the first two measures, and using the ten-year average ratio of R & D plus capital expenditures to total assets for the third.

The measure of environmental volatility used in this study was a modification of Tosi and colleagues' (1973) measure. As Downey and Slocum (1975) noted, they did not detrend their sales and profit measures, so they did not measure volatility as defined in the present study; with their measures, a

²Since Hypotheses 2 and 3 deal with consensus of top management team perceptions, responses from fewer than three executives in a firm were considered to be inadequate. Thus, Ret-2 was excluded from some analyses. So, a lower *n* is reported in the statistical correlations from these analyses than for the rest.

TABLE 1
Characteristics of 20 Firms Included in Sample

Firm ^a	Predominant SIC Code	Industry	Approximate Sales (\$mm)	Number of Respondents	Relative Economic Performance ^b
Services					
Ret-1	5133	Apparel, piecegoods, and notions	\$ 8	3	-0.927
Ret-2	5411	Groceries	700	2 of 4 ^c	0.254
Ret-3	5912	Drugstores	420	4	0.638
Ret-4	5411	Groceries	230	4	0.322
Ret-5	5944	Jewelry	20	4	-3.822
Wls-1	5141	Wholesale groceries	330	5	0.478
Wls-2	5148	Wholesale fruit and vegetables	270	7	0.256
Wls-3	5039	Wholesale construction materials	60	6	0.297
Wls-4	5088	Transportation equipment	30	3	0.232
Frt-1	4712	Freight forwarding	130	8	0.288
Frt-2	4213	Trucking	31	4 of 5 ^c	0.570
High technology					
R&D-1	3825	Instruments for measuring electricity	50	10	0.424
R&D-2	3573	Electronic computing equipment	2	3 of 5 ^c	0.802
R&D-3	3841	Surgical and medical instruments	20	7	0.523
R&D-4	3728	Propulsion engines (rockets)	14	7	0.027
Manufacturing					
Mfg-1	2082	Brewing	50	4	-0.359
Mfg-2	3732	Boat building	7	3 of 4 ^c	0.259
Mfg-3	3732	Boat building	18	7	-0.031
Mfg-4	2631	Forest products	300	5	0.205
Mfg-5	3861	Photographic supplies	10	4	-0.311

^aRet = retailer; Frt = transporter or freight forwarder; Mfg = manufacturer; Wls = wholesaler; R&D = high technology firm.

^bStandardized scores derived from factor analysis of various indicators, explained in text.

^cNumber responding out of total receiving questionnaires, reported if response was less than 100% in that particular firm.

high but constant, and thus predictable, rate of change can result in a high coefficient. I took the coefficient of variation of first differences from year to year, so the measure is free of influences from major trends and is a true indicator of discontinuities.³ Technological volatility was measured the same way Tosi and colleagues did. A fourth volatility dimension consisted of the Department of Commerce's changing annual projections of industry output computed with the first-differences method. The volatility coefficients were computed over the five years preceding data collection (1971-76). The four coefficients were to be factor-analyzed and reduced, if possible, to a single volatility index via a weighted linear combination, with weights corresponding to the factor score coefficients on the first factor derived from principal component analysis (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975). My criterion for accepting the one-factor solution was its explaining more than 60 percent of the total variance of the four coefficients. If the 60 percent threshold were not reached, a two-factor solution would be used following varimax rotation of the original factors.

Perceived Environmental Uncertainty and Strategic Goals

Each perpetual attribute was measured through individual managers' responses, which were aggregated to yield a top management team score, one per firm.

Perceived environmental uncertainty. This variable consisted of the total uncertainty score obtained with a version of Duncan's (1972) instrument, with several significant modifications. First, Duncan studied subunits or workgroups, but this research looked at the strategic level of total organizations. Thus, rather than referencing subunit decisions, my questionnaire referenced strategic decisions. Second, Duncan included internal as well as external organization components and factors in his definition of environment. The present research was concerned exclusively with the external environment, so the instrument measuring perceived environmental uncertainty incorporated only components of an external task environment, as listed in Table 2. Third, since managerial time was at a premium, only one question was used to tap each of Duncan's three dimensions. The high inter-

³The coefficient of variation of first differences was computed as follows:

$$\text{Volatility}_i = \frac{\sqrt{\sum_{j=1}^5 \frac{(x_j - \bar{x})^2}{5}}}{\bar{x}}$$

where i = industry characteristic (sales, earnings),

j = year (1972-76),

$x_j = (i_{j+1} - i_j)$,

and

i_j = industry characteristic in year j .

TABLE 2
Components of the External Task Environments of Organizations^a

Customer component:
Distributors of product or service
Actual users of product or service
Suppliers component:
New materials suppliers
Equipment suppliers
Product parts suppliers
Labor supply
Competitor component:
Competitors for suppliers
Competitors for customers
Socio-political component:
Government regulatory control over the industry
Public political attitude towards industry and its particular product
Relationship with trade unions with jurisdiction in the organization
Technological component:
Meeting new technological requirements of own industry and related industries in production of product or service
Improving and developing new product by implementing new technological advances in the industry

^aAdopted from Duncan (1972: 315).

nal reliability coefficients that were reported (Duncan, 1971) made the use of a subset of questions reasonable.⁴

Perceived environmental uncertainty (PEU) for each top management team was calculated as follows: First, perceived environmental uncertainty on each environmental component (Table 2) was calculated for each individual team member. Then, member scores were pooled to get the mean and the standard deviation on each component for the entire team. Finally, the mean of the five components served as the overall perceived environmental uncertainty score for a top management team. Since Hypothesis 2 dealt with perceptual homogeneity or heterogeneity, a PEU diversity index was also computed by summing the five component standard deviations.

Goals. Strategic goals were measured by a question adopted from an earlier study (Bourgeois 1980b) that lists 12 possible corporate objectives (for example, maximize profit over five years, or maximize market share) and asks respondents to rate the importance of each to their firm on a 1 to 5 scale. Hypothesis 3 concerned level of agreement or disagreement among top managers, so a goals diversity score was calculated by summing a team's standard deviation on each goal item. Number of goals was calculated in two ways: (1) from the sum of the responses to all 12 items for each manager, and (2) from the sum of all the managers' responses of 5 ("extremely important")

⁴ Details of these modifications, their rationale, and computations are available from the author.

to the firm). In both cases a firm's score was the mean score for its whole top management team.

Economic Performance

Economic performance was defined as the composite of return on total assets, growth in net earnings, growth in earnings per share (EPS), improvement in profit margin (return on sales), and growth in capital averaged over the five years preceding data collection (1971–76). A composite measure derived through factor analysis was used to balance the potentially conflicting growth and profitability objectives of the firm, but it was expected that all of these performance indicators would be highly intercorrelated. Growth in capital and growth in net earnings reflect growth, or increases in shareholder wealth; and return on investment, EPS growth, and profit margin growth reflect efficiency or profitability measures. As with the volatility measures, the five economic performance measures were to be reduced to a single index if the first factor extracted from the principal component factoring explained at least 60 percent of the shared variance.

DATA ANALYSIS AND RESULTS

Environmental Volatility

Although each of the four environmental volatility variables could serve as a unique index of a firm's objective volatility, the four volatility indices were not, as Table 3 shows, significantly correlated. The statistical solution to the potential problem of four separate volatility analyses was to locate some factor or set of factors that explained a significant proportion of the shared variance among the four variables.

Although a single-factor solution, one meeting the 60 percent criterion, was desirable for simplifying subsequent analysis, the results of the factor analysis performed on the volatility data were not so ideal. The first factor explained only 38.6 percent of the variance, and the second, orthogonal factor explained an additional 24.5 percent; so a two-factor solution explaining 63.2 percent of total variance was accepted (see Table 3b). The two factors were named according to the distinction made earlier in this paper between market or commercial volatility, and technical or technological volatility.

Economic Performance

The five indicators were factor-analyzed and reduced to a single performance index with a weighted linear combination. The one-factor solution accounted for 65.9 percent of total variance; Table 4 shows the factor loadings. The resulting factor scores yielded an economic performance value for use as the criterion variable in subsequent analysis. Table 1 reports the values that resulted for each firm. Given the low factor loading on return on total assets, the extracted factor is essentially a growth performance indicator.

TABLE 3
Correlations and Results of Factor Analysis for Volatility Variables

(a) Pearson Product-Moment Correlations

Volatility Variables	1	2	3	4
1. Sales	1.000	-.249	.299	.049
2. Earnings		1.000	-.221	-.051
3. Department of Commerce projections			1.000	.117
4. Technological				1.000

(b) Factor Structure and Communalities

Volatility Variables	Factor Loadings		Communalities
	Commercial Volatility	Technological Volatility	h^2
Sales	.751	-.023	.565
Earnings	.684	.046	.470
Department of Commerce projections	.689	.219	.523
Technological	.036	.983	.968
Eigenvalue	1.544	.982	2.526
Percent of total variance	38.6	24.5	63.2

TABLE 4
Economic Performance Variables: Factor Structure and Communalities

Economic Performance Variables	Factor Loadings	Communalities
	Performance	h^2
Return on total assets	.103	.011
Growth in:		
Net earnings	.977	.955
EPS	.977	.955
Return on sales	.981	.961
Capital	.643	.413
Eigenvalue	3.295	3.295
Percent of total variance	65.9	65.9

Before the perceptual data were analyzed, volatility and performance were correlated in order to ascertain that volatility alone did not account for variance in performance. Since economic performance displayed no systematic relationship with Factor 1, commercial volatility ($r = .009$), and only a weak negative association with the technological volatility factor ($r = -.261$), I proceeded to test for relationships between performance and the strategy-making elements.

Hypothesis 1: Perceived Environmental Uncertainty–Volatility Congruence

As Dewar and Werbel (1979) pointed out, contingency predictions are hard to test owing to a lack of standard operational definitions of the notion of fit. Many studies split their samples into high and low congruence and use analysis of variance to test for performance differences, which tests the statistical significance, but not the strength of the relationship—the degree to which fit affects performance. In this study, a continuous measure of congruence between perceived environmental uncertainty and volatility, or fit, was derived (1) by standardizing all firm-level perceived environmental uncertainty scores to z-scores and (2) by subtracting this standardized score from each of the two already standardized volatility factors. The absolute value of the result gave a measure of a firm's perceptual divergence from its true relative position. The two divergence scores, one each for commercial and technological volatility, were then summed to yield an overall divergence score.

With this computation, the higher the score, the higher the divergence of perceived environmental uncertainty from objective volatility. A negative correlation with economic performance would indicate support for Hypothesis 1.

The significant negative correlations shown in Table 5 indicate strong support for Hypothesis 1: congruence between volatility and perceived environmental diversity explains over 30 percent of the variance in economic performance. This is shown by the first figure in Table 5, the zero-order product-moment correlation, which is significant and in the predicted direction.

To verify that this relationship would hold in general—that it would hold independent of the level of environmental volatility—it was tested with partial correlations controlling for volatility. The second-order partial correlation shown in Table 5 exposes the relationship between perceptual accuracy and performance when both of the environmental volatility factors are controlled for simultaneously. The significant result in the predicted direction reveals that, in general, congruence between perceived environmental uncertainty and volatility tends to associate positively with performance even when volatility is controlled for—that is, the fit requirement holds for all levels of volatility. This is further reinforced by the second-order partial's practically insignificant improvement over the zero-order coefficient.

TABLE 5
Tests of Hypotheses 1, 2, and 3

Hypotheses		Predictor Variables	Economic Performance
H1:	PEU-volatility divergence		
	Zero-order correlation (n = 20)	Divergence	-.555**
	Second-order partial ^a (df = 16)	Divergence	-.563**
H2:	PEU-diversity ^b		
	Zero-order correlation (n = 18)	PEU diversity	.491*
	Second-order partial ^a (df = 14)	PEU diversity	.531*
H3:	Goal diversity ^b		
	Zero-order correlation (n = 19)	Goal diversity	.495*
	Second-order partial ^a (df = 15)	Goal diversity	.505*

^aControlling for both commercial and technological volatility factors.

^bWithin top-management teams.

*p < .05

**p < .01

Hypothesis 2: Diversity in Perceived Environmental Uncertainty within Firms

As is evident from Table 5, perceptual disagreement within a top management team is positively correlated with performance, regardless of the level of environmental volatility. Although results supported the universal aspect of the hypothesis—that is, controlling for volatility did not significantly alter the original relationship—the direction of the relationship between diversity in perceptions and performance was opposite to what had been predicted. Thus, as the level of disagreement of perceptions among top management teams increases, so does the level of economic performance. The implications of this will be explored presently.

Hypothesis 3: Goal Diversity within Firms

Table 5 shows the test for Hypothesis 3. As was found for Hypothesis 2, the universal aspect of the hypothesized relationship held, and the relationship was in the opposite direction of what had been predicted. Thus, goal diversity—not consensus—is positively and significantly related to performance, independent of level of volatility.

These deviations from the expected direction for both Hypotheses 2 and 3 prompt speculation as to whether a relationship with some variable other than volatility exerted an influence. The presence of significant relationships between performance and all three of the predictor variables entered into the analysis so far prompted a look at their interrelationships. Table 6a shows that these variables are significantly intercorrelated.

The nature of the intercorrelations suggests that although diversity as to perceived environmental uncertainty and goal diversity tend to increase or decrease together, they both move in the opposite direction to divergence

TABLE 6
Correlations among Divergence, Diversity of Perceived Environmental
Uncertainty, Goal Diversity, and Economic Performance

(a) Zero Order Correlations

Variable	Product-Moment Correlation Coefficients			
	1	2	3	4
1. Divergence	1.000	-.527*	-.539**	-.555**
2. PEU diversity		1.000	.543**	.491*
3. Goal diversity			1.000	.495*
4. Economic performance				1.000

(b) Second-Order Partial Correlations^a

Variable	PEU Diversity (<i>n</i> = 18)	Goal Diversity (<i>n</i> = 19)
Economic performance		
Zero-order correlation	.491*	.495*
Controlling for divergence	.158	.267

^aControlling for divergence between perceived environmental uncertainty and volatility.

**p* < .05

***p* < .01

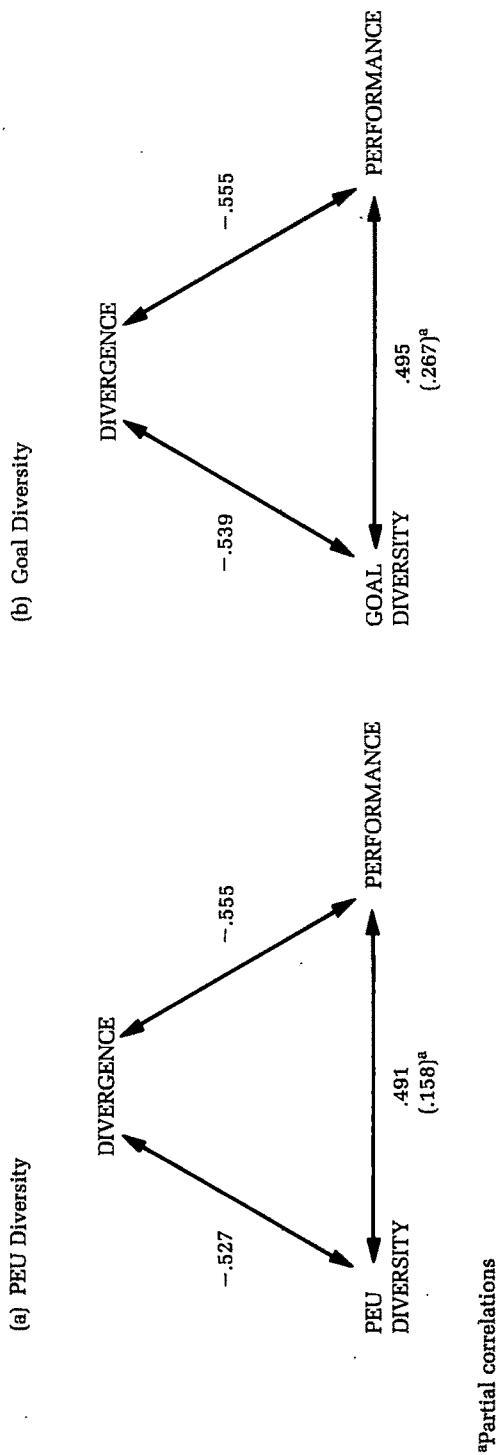
between perceived environmental uncertainty and volatility. Since divergence itself is so strongly correlated with performance, it was used as a control variable to retest the relationships between perceived-environmental-uncertainty and goal diversities with performance. Table 6b displays the result of partialling out divergence.

The significant drop in the relationship between diversity as to perceived environmental uncertainty and performance indicates that most of the original relationship was an artifact of their mutual association with divergence. Similarly, although less dramatically, a fairly large decline in the goal diversity/performance coefficient occurred. (To convey more clearly what is occurring, Figure 1 presents the intercorrelations between both sets of three variables.) These declines mean that as perceptual divergence from true volatility increases, within-firm variance in both environmental perceptions and goals decreases and performance suffers, while most of the positive relationship between performance and diversity as to environmental perceptions or goals is artifactual. Translated, this suggests that as a firm's strategic-level perceptions of uncertainty become increasingly errant, its managers tend to agree among themselves in both their misperceptions and their goals, while their firm takes a dive.

Hypothesis 4: Number of Corporate Goals

This hypothesis was explored in two stages: (1) number of goals was examined in relation to volatility; (2) its relationship to performance was

FIGURE 1
Intercorrelations of Performance and Divergence between Perceived
Environmental Uncertainty and Volatility with Diversity



scrutinized with correlations and partial correlations. Table 7a gives the results of the first step. According to this table, the number of corporate goals a firm attends to has virtually no relationship with objective volatility, but has a weak positive relationship with perceived environmental uncertainty. However, even in the latter case, the numbers are not strong enough to be anything more than mildly suggestive. So, what is the relationship between number of goals and economic performance? Table 7b indicates that there is none; nor does a contingent relationship suggest itself when volatility is controlled for.

TABLE 7
Tests of Hypothesis 4: Number of Corporate Goals

(a) Number of Goals vs. Volatility and Perceived Environmental Uncertainty

Goal Variables	Commercial Volatility	Technological Volatility	Perceived Environmental Uncertainty
Total goals score	.141	-.046	.291
Number scoring 5	.048	.093	.287

(b) Number of Goals vs. Performance

	Economic Performance
Zero-order Correlations ($n = 20$)	
Total goals	-.010
Number of 5s	.022
Controlling for volatility ($df = 16$)	
Total goals	.016
Number of 5s	.313

DISCUSSION OF RESULTS

What can be distilled from the exploration of the working hypotheses guiding this study? The following is a quick review of the apparent facts derived from the analysis, without reference to specific hypotheses:

1. Congruence between perceived environmental uncertainty and volatility is positively related to economic performance.
2. Both diversity in environmental perceptions and diversity in goals within firms relate positively to performance, but both of these relationships depend on diversity of both kinds also being highly related to congruence between perceived environmental uncertainty and volatility.
3. The presence of consensus as to perceived environmental uncertainty and goal consensus together is associated with poor economic performance.

4. Number of strategic goals has no significant relationship to performance.

These, then, are the empirical derivations. What do they mean? More important, what do they mean when considered together?

The small sample size of this study necessitates the exercise of caution in interpreting the results. Also, since this was a correlational study, the possibility of reciprocal causality between and among variables exist. But, in order to draw tentative conclusions, I will "speak" causally, first positing performance as the dependent variable, then as the independent variable. In both of these approaches, inferences are made at the simplest level—that is, the more or less obvious conclusions will be drawn without consideration of a lot of interactive effects among the variables. Then, I will posit performance to be either dependent or independent, depending on the logic of the situation, and draw more complex inferences than those drawn from the first two approaches by taking second-order interactions into account. Finally, I will draw whatever normative inferences seem plausible, fully recognizing their tentative nature.

Economic Performance as Dependent Variable

A firm that exhibits perceptual acuity, or congruence between perceived environmental uncertainty and volatility, will achieve higher levels of economic performance, than firms that do not exhibit this quality. High within-firm variance on perceived environmental uncertainty, however, as well as on goals emphasis, also seems to enhance performance.

The first result, more or less dictated by logic, was not surprising. It has also been implicit and occasionally articulated in the normative literature, but this is the first empirical confirmation of the importance of perceptual acuity.

Accompanying the conclusion that perceptual acuity enhances performance is the complementary conclusion that perceptual divergence hurts performance. To the extent that strategic decision making relies on information transmitted by top management, when top management misperceives its environment it probably reacts inappropriately to real situations and needlessly expends resources by implementing decisions based on faulty information. Other authors (Downey & Slocum, 1975; Galbraith, 1973) have implied that if an organization unjustifiably perceives certainty in its environment while in fact that environment is uncertain, the organization most likely will consume slack resources in performing its tasks. It follows, for example, that managers who perceive certainty in a volatile environment would not take precautionary measures that those perceiving uncertainty might take; or, they might simply lack the readiness to adapt that the perception of uncertainty might bring. When discontinuities do occur, these managers might react too late to exploit them, or so late that they take losses in making an adjustment. As an example, Mfg-5, the bankrupt photo finishing firm, which scored very low on perceived environmental uncertainty, opened new outlets and inventoried photographic supplies just before Kodak

introduced new film processing technology that rendered that inventory obsolete, resulting in the firm having to take a substantial write-off.

On the other hand, managers who perceive a high degree of uncertainty in stable environments may overexpend on unneeded uncertainty reduction or simply suffer from being unnecessarily skittish. This could be manifested, for example, in a stable-environment retailer's underinvesting in inventory and subsequently losing business through being out of stock.

The results regarding perceived environmental uncertainty and goals diversity, although initially surprising, are explainable *post hoc*. Since the normal situation is for top management team members to have different functional responsibilities, it is reasonable to expect that managers will not only perceive different segments of an environment and consequently experience different levels of perceived uncertainty, but will also, in attending to different constituencies, have different goals. Both conclusions tend to reinforce the clinically derived findings of Lawrence and Lorsch in their 1967 study of ten firms, in which they found that production, marketing, and R & D personnel all faced distinctly different environmental uncertainties and had different goal orientations.

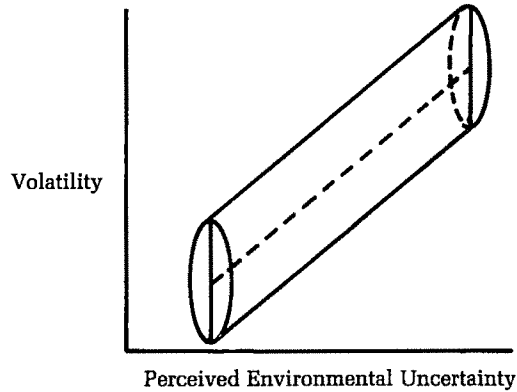
The conclusions of the present study are somewhat different from those of Lawrence and Lorsch, however. My data suggest that a high level of differentiation of perceptions among top management teams is universally desirable, not just in unstable environments, as they suggest. Perhaps the difference lies in their having used subjective measures of environmental stability, whereas I measured volatility objectively.

The converse would also hold: within-team consensus on both perceived environmental uncertainty and goals should lead to poor performance. The normative implication parallels that of Irving Janis's (1972) exhortation to avoid the perils of groupthink—that is, a firm should emphasize diversity in both vision and direction among its top managers, for in consonance comes insulation, arrogance, tunnel vision, blindness, and Watergate-style feelings of moral omnipotence. Diversity in perception, however, removes blinders, and diversity in goals prevents insulation from a firm's constituencies.

So, at the simplest level of analysis, with only zero-order correlations considered, my first conclusion was that, although large within-firm perceptual diversity enhances performance, it does so only when the mean perceived environmental uncertainty among top managers is congruent with the objective volatility level. Also, managers emphasizing different goals will enhance performance. Thus, the model in Figure 2 is suggested for high performing firms. This diagram indicates that mean levels of perceived environmental uncertainty should be in accord with volatility, but that there should be some variance around that mean. That variance, whether it be on perceived environmental uncertainty or goals, should be high regardless of the volatility level—that is, the relationship holds under all environmental conditions.

The data on number of goals did not yield statistically significant results,

FIGURE 2
Environmental Volatility and Perceived Environmental Uncertainty
in High-Performing Firms



suggesting that the number of goals held by senior management has no effect on performance. One of the arguments for Hypothesis 4 was that a large number of goal hurdles might reduce risk in volatile environments. However, one could argue that a large number of hurdles increases likelihood of no action or delayed action, which can be undesirable in a volatile environment. If both these arguments are plausible, then their net effect is to cancel each other out, which would account for the lack of measurable results.

The next section presents another frame of reference, with performance considered as the causal variable.

Economic Performance as Independent Variable

The data indicated that a firm that achieves a high level of economic performance also tends to examine its environment with great perceptual acuity. Also, the better the economic performance, the greater the within-firm diversity as to both perceived environmental uncertainty and goals.

Perhaps effective performance enables a firm's management to spend considerable time away from internal affairs and to concentrate on external issues, a freedom that yields more accurate reactions, or perceptions of uncertainty, in relation to an objective external situation than less effective firms can muster.⁵ The same concentration on external affairs and information might allow each manager to perceive mainly that segment of the environment most relevant to that manager's subunit's operation, thus producing the perceptual differences between managers represented in the data.

⁵Incidentally, it was necessary to make a great number of attempts to reach managers of high-performing firms for a follow-up phone call; they seemed to be out more often than not.

With respect to the notion of diversity of goals within a top management team resulting from a high level of economic performance, one need only to draw upon Cyert and March's (1963) description of how generation of organizational slack gives a firm enough maneuvering space to allow conflict avoidance through multiple goal satisfaction. In such a situation, different factions can pursue their own goals without getting in each other's way.

What do the negative performance results suggest? For one thing, if a management with declining fortunes sees threat in unison, variance in perceived environmental uncertainty is low. Also, declining performance removes the slack alluded to in the preceeding paragraph, attenuating ability to accommodate divergent goal sets, perhaps even forcing a whole top management team to concentrate on survival goals. The lowest performer in the sample, for example, actually had posters on each top manager's office wall, announcing sales, profit, and return-on-total-assets targets for the next six months!

Performance and Strategy Making as Interactive

A more complex exposition emerges from an analysis expanded to include both the second-order statistical relationships and reciprocal causation. In terms of economic performance, recall that the explanatory power of diversity of perceptions within top managements dropped significantly when divergence between perceived uncertainty and volatility was controlled for, and that the explanatory power of goals diversity dropped by about 50 percent (see Table 6). Since both diversities are negatively associated with divergence, and divergence is negatively associated with performance, the following interpretation arises.

As a firm's accuracy in perceiving its environment diminishes—that is, as its misperceptions of reality increase—its managers tend to agree more and more about their misperceptions and about their goals while the firm's performance suffers. Figure 3 expresses this condition graphically.

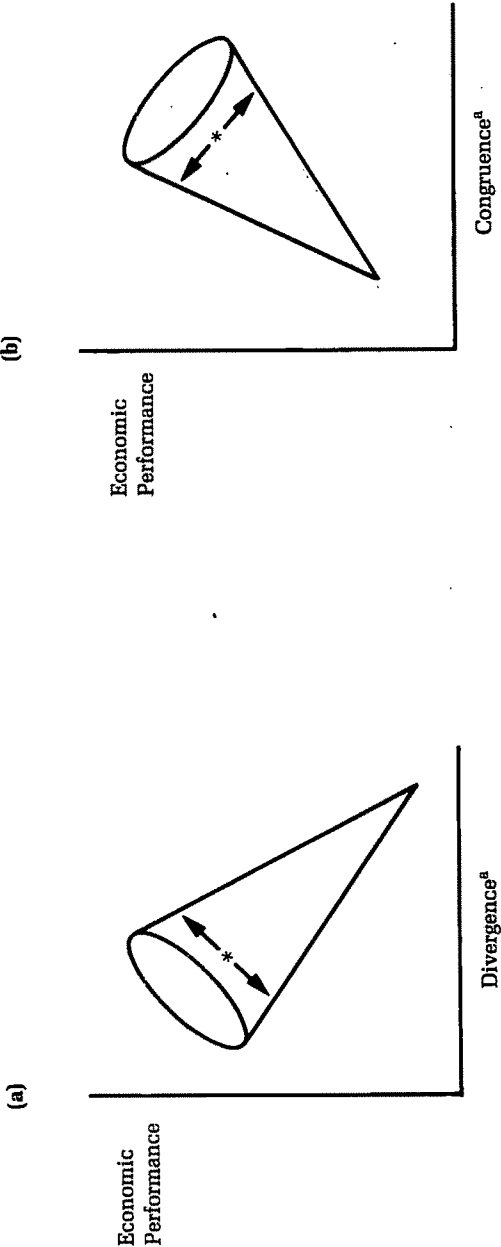
The area at the base of the inverted cone represents the degree of heterogeneity or diversity among managers' environmental perceptions and goals. So, as divergence increases (Figure 3a) and the perceptions and goals of top managers become increasingly focused at the nose of the cone, performance declines. Conversely, as congruence increases (Figure 3b), and top managers' perceptions and goals disperse, performance improves.

Normatively, this would suggest that a firm should seek to perceive its environment as accurately as possible on the average, while members of its top management team focus on sufficiently different aspects of the environment so that their perceptions will not be homogeneous and they will maintain different goal sets adequately representing the firm's various constituencies.

Summary Model

When all of the results are taken into account, the implications can be

FIGURE 3
Economic Performance and Divergence/Congruence
between Perceived Environmental Uncertainty and Volatility



^aWithin top management team diversity in PEU or goals or both.

TABLE 8
Strategy Making in Different Environments:
Requisite Levels for Higher Economic Performance

Environmental State	Perceived Environmental Uncertainty	Diversity of PEU	Diversity of Goals	Number of Goals
Stable	Low	High	High	n.a. ^a
Volatile	High	High	High	n.a. ^a

^an.a. = not ascertainable from the data.

summarized as in Table 8. In that table, high and low refer to the value that, these results imply, firms should place on each of the strategy-making variables explored in this research.

IMPLICATIONS OF THE STUDY

In defining the search for organizational rationality through uncertainty reduction as the "core of administration," and coping with uncertainty as the "essence of the administrative process," James Thompson (1967:149) summarized the central thrust of management theory that evolved in the 1960s and is fully accepted today. "Eliminate uncertainty!" "Buffer your technical core!" These are the prescriptions that have emanated from the open-systems school. Although the traditional management theorists prior to the human relations era, like Fayol, Follet, Taylor, and Weber, ignored uncertainty altogether by taking a closed-systems perspective, current thinking recognizes uncertainty as a phenomenon to be dealt with through its reduction.

The results of the present research, however, imply that firms should only reduce uncertainty under stable environmental conditions. Uncertainty should not be reduced if it is, in fact, an accurate manifestation of the objective situation. In fact, *uncertainty may be functional in volatile environments, at least when it is experienced at the strategy-making level of the organization.* This conclusion suggests a shift in normative orientation; that is, reduction of uncertainty, although functional at low administrative levels, should be regarded as potentially dysfunctional at strategic levels. Administrative theorists can take a cue from financial theory, where the central paradigm for the last decade has centered around the concept of risk aversion, a concept that parallels our uncertainty avoidance. Unlike administration, finance has long recognized that risk, measured by volatility, is acceptable at any of various levels, so long as the expectation of or demand for a higher rate of return accompanies the acceptance of risk (Bettis, 1982; Bowman, 1982).

Other evidence suggests that uncertainty should be confronted rather than avoided, if the environmental volatility level warrants it. The cases Miles and Snow (1978) studied suggested that as volatility increased, firms that could be characterized as "prospectors" in their task environments performed better than "reactors" or "defenders." The last two types tended to

close themselves off from their environments—to avoid the uncertainties present in their objective situations—but the prospectors tended to seek uncertainty by exploring such uncharted areas as new product development. As Miles and Snow reported, uncertainty avoiders in volatile environments who failed to change their strategic postures from reactors to defenders or from defenders to “analyzers” were likely to perish.

The dilemma for managers in unstable environments is not different from that of rational beings in a complicated universe. We search for order and simplicity, seeking clarity with such zeal that we nearly bring it into being where it doesn't exist. In stable environments this might not be too dangerous. But for rational beings and managers in constantly changing environments, attempts to avoid uncertainty and to gather complete agreement on perceptions and goals may be more deleterious than helpful and actually impede performance.

CONCLUSIONS

One of the most perplexing problems in studying strategy is the many variables competing for attention. One of the greatest limitations of science is its inability to deal cogently with more than a few variables at a time. Yet, no matter how carefully these variables are chosen in the expectation that they will share explainable variance—and the explained variance in this study was significant—the ineluctable intrusions of those exogenous variables that we have chosen to ignore will always threaten our ability to make reliable inferences from the data.

The following example indicates the kind of occurrence that can upset confidence in inferences from this kind of research. During the data-gathering phase of this study, one firm in the sample was courting a second as a potential merger partner in order to avoid the takeover threat being posed by a third firm in the sample. Simultaneously, the CEO of the focal firm was engaged in a political battle with his board of directors. It is difficult to estimate the potential noise present in any measure of either perceived uncertainty or corporate goals for the firms involved, and it is uncomfortable to contemplate such noise in relation to reliability of the measures.

There is not much that can be done about such unavoidable sources of noise in the data—they can neither be controlled, manipulated, nor measured. But until strategy making can be brought into the laboratory, the foregoing are problems that strategy-process researchers must learn to live with and accept. In the meantime, as in the present study, relationships inferred from data must serve as bases for models of aspects of the strategy-making or coalignment process. To the extent that this research improves understanding of that process, it will have contributed to the emerging field of strategic management.

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FAMILY LIFE DISRUPTIONS: EFFECTS OF JOB-INDUCED STRUCTURAL AND EMOTIONAL INTERFERENCE

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Workers and their spouses were surveyed to examine the effects on family interactions of two correlates of shift work: (1) interference between job and family roles caused by structural conditions; and (2) emotional interference, indicated by health, mood, and behavioral symptoms. Emotional interference was consistently related to family life outcomes, but structural interference was found to have little effect on quality of family life. Contrary to predictions, quality of family life was not significantly related to employees' intentions to leave the company.

In the nearly 20 years since the seminal Michigan study of organizational stress (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964), studies have repeatedly demonstrated the negative effects of job-related stressors on employees (Beehr & Newman, 1978; Van Sell, Brief, & Schuler, 1981). The typical study of job stress examines relationships between organizational context variables, such as structure and leadership style, and employees' affective reactions, such as tension and job dissatisfaction. In addition, several studies have linked job-related stressors to more objective outcomes like deterioration of health, absenteeism, job performance, and turnover (Bagozzi, 1978; Brief & Aldag, 1976; Caplan & Jones, 1975; Gupta & Beehr, 1979; Jackson, 1983; Lyons, 1971; Rousseau, 1978). Taken as a whole, this literature shows that both organizations and their employees suffer when the level of stress employees experience is high.

Recently, stress researchers have begun to emphasize that the effects of job-related stress are not limited to work behaviors and affect—negative effects may extend to employees' nonwork lives. Several studies have reported correlations between reactions to jobs and general life satisfaction,¹ and a few have reported correlations between employees' reactions to their jobs and the quality of family life experienced by their family members (Burke, Weir,

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¹See Kabanoff (1980) and Near, Rice, and Hunt (1980) for reviews.

& DuWors, 1979; Jackson & Maslach, 1982). Unfortunately, the existing literature relevant to the nature of the relationship between work and nonwork is currently quite fragmented. Therefore, one goal of this paper is to clarify two conceptually distinct approaches to understanding the processes through which work affects life outside of work. A second goal is to evaluate support for each approach through assessments of a sample of employees and their families.

PAST APPROACHES

Theoretical approaches to understanding the relationship between work-related stress and family experiences fall into two general categories: structural interference theories and emotional interference theories (cf. Near et al., 1980). Structural interference theories argue that the quality of off-the-job activities and experiences—for example, family life—derives from the extent to which job requirements restrict employees' opportunities to engage in such activities. The emphasis is on the structural relationship between job and nonjob demands. Structural interference hypotheses link a dependent variable, quality of family life, to objective work and family conditions, such as (1) number of hours worked (Burke, Weir, & Duwors, 1980; Pleck, Staines, & Lang, 1980); (2) frequency and amount of overtime and flexibility of work or shift schedules (Pleck et al.); and (3) spouse's work schedule and number and age of children present in the family (Beutell & Greenhaus, 1982; Burke & Bradshaw, 1981; Burke et al., 1980). Greenhaus and Beutell (1985) have hypothesized that structural variables such as these affect the amount of interrole conflict—conflict between job and family demands—and limit employee experiences, thereby interfering with the ability of employees to function optimally in either role. Structural interference theories, if correct, imply that organizations can minimize negative effects of work off the job by minimizing structural conflict between job and family schedules.

In contrast, emotional interference theories emphasize the effects of employees' emotional reactions to a job on quality of family life. Emotional interference theories focus on the relationship between employees' affective responses to their jobs and home lives. Hypotheses relate quality of family life to tension, fatigue, and psychosomatic symptoms (Burke et al., 1980; Jackson & Maslach, 1982). The argument is that negative job-induced emotions can disrupt family life because they are carried home and allowed to color employees' interactions with family members. For example, compared to other workers, employees suffering from job burnout display more hostility at home and are more likely to withdraw from their families (Jackson & Maslach, 1982). Thus, differing assumptions about the relative importance of (1) objective, structural conditions and (2) subjective reactions to jobs distinguish the two theoretical approaches.

HYPOTHESES

Although past research typically has adopted either a structural interference or an emotional interference perspective, the two are not mutually

exclusive. The present study tested several structural and emotional interference hypotheses, using a sample of shiftworkers and their families. We hypothesized that families feel the immediate effects of both structural and emotional interference, and that their reactions then influence employees' attitudes toward their jobs (Mowday, Porter, & Steers, 1982). The present study assessed both structural conditions and affective reactions relevant to work and nonwork domains as Near and colleagues (1980) suggested. In addition, we assessed quality of family life through reports from both employees and their spouses or partners, thereby reducing the likelihood that response bias might explain observed correlations.

Hypothesis 1: (1) Quality of family life as reported by spouses, (2) satisfaction with job/family congruence as reported by employees, and (3) spouses' satisfaction with employees' jobs will be associated with structural interference and emotional interference.

We measured structural interference by objective job and family characteristics that have been identified in the literature as causing time-based conflict. Time-based conflicts, a major aspect of structural interference, exist when individuals spend time to physically fulfill one set of role duties, like job duties, at the expense of time needed to fulfill the duties of another role, such as a family role. We measured emotional interference through reports of physiological, psychological, and behavioral symptoms whose presence indicates that individuals are coping poorly with existing stressors; consequently, their families are likely to experience spillover effects from emotional interference (Bartolome & Evans, 1980). Included in the present study are symptomatic reactions of particular relevance to shiftworkers (cf. Agervold, 1976; Dunham, 1977), as well as several traditional stress symptoms.²

Hypothesis 2: Intentions to leave voluntarily will be associated with (1) quality of family life as reported by spouses, (2) dissatisfaction with job/family congruence as reported by employees, and (3) spouses' dissatisfaction with employees' jobs.

The predictive value of these three variables should be significant even after known predictors of intention to leave a job—age, tenure, and job dissatisfaction—have been controlled. Therefore, the present study controls for the predictors: age, tenure, and job dissatisfaction (cf. Mobley, Griffeth, Hand, & Meglino, 1979). Several studies of job-related stress have shown that an employee's stress reactions correlate positively with intention to leave a job (e.g., Bedeian & Armenakis, 1981; Lyon & Ivancevich, 1978; Lyons, 1971). Frequently, researchers have assumed that job-related stress reactions lead to job dissatisfaction, which in turn leads to intentions to leave. However, it is possible that families also play a role in determining employees' intention to leave. For example, Ross and Zander (1957) found that both job interference

²See Ivancevich and Matteson (1980) and Van Sell et al. (1981) for reviews.

with family and employees' degree of satisfaction with their community were strongly related to leaving intentions. Results from AT&T's Management Progress Study revealed that 19 percent of voluntary departures from AT&T were attributed to "home/personal" reasons (Bray, Campbell, & Grant, 1974:167). If an employee's current job negatively affects a family's quality of life, that family may pressure the employee to seek an alternative. Thus, Hypothesis 2 explicitly recognizes that a person's behavioral intentions are a function of both personal attitudes and normative expectations communicated by significant others (Fishbein & Ajzen, 1975; Pahl & Pahl, 1971).

METHODS

Participants

The individuals asked to participate in the present study were a randomly selected subsample from a total population of 1,130 plant operators working at a large power and gas utility who were involved in the study on shiftworkers (Zedeck, Jackson, & Summers, 1983) of which the present study was a part. To obtain this subsample we had plant supervisors distribute 200 matched pairs of questionnaires. Instructions asked plant employees to solicit the participation of their spouses or live-in partners. Participants returned questionnaires anonymously, by mail, directly to us; number codes printed on the questionnaires enabled us to match employee responses with those of the appropriate spouse or partner.

These procedures yielded usable responses from 95 couples. One member of each couple was a plant operator working on a 28-day rotating shift schedule as follows: six day shifts, two days off; seven swing shifts, four days off; seven graveyard shifts, two days off.³ All employees had nonsupervisory jobs. Demographic characteristics of employees in the present study's sample were very similar to those of the overall study population (cf. Zedeck et al., 1983); responding shiftworkers were predominantly male (95%), white (58%), and between the ages of 25 and 34 (45%).

Measures

In addition to providing the demographic information summarized in the preceding paragraph, employees responded to items about (1) objective characteristics of their job and personal life that could create structural interference, (2) emotional interference caused by the job, as reflected in physical, affective, and behavioral symptoms, (3) their dissatisfaction with job/family congruence, (4) turnover intentions, and (5) overall job dissatisfaction. Each employee's spouse or live-in partner responded to items about (1) quality of family life in the home, and (2) dissatisfaction with the employee's job. Detailed descriptions of these measures follow.

Structural interference. The study assessed six objective conditions identified in the role conflict literature as contributors to structural interfer-

³The day shift hours were 7 a.m. to 3 p.m. The swing shift hours were 3 p.m. to 11 p.m. The graveyard shift hours were 11 p.m. to 7 a.m.

ence: (1) number of children 18 years old or younger; (2) employment status of spouse or partner; (3) dissimilarity between schedules of partner and employee; (4) amount of time employee spent commuting to work; (5) whether available community recreational facilities accommodated employee's work schedule; and (6) average number of overtime hours worked per week. Responses to these items were scored such that high values indicated structural interference.

Emotional interference. Three categories of symptoms indicative of negative emotional reactions were assessed: physical health, psychological mood, and behavioral adjustment.

To obtain an index of overall physical health, we obtained and summed four indicators of health conditions. One item assessed general health ("In general, how would you describe your health?"), and three subscales assessed specific health conditions,⁴ namely, digestion problems (8 items, $\alpha = .86$), muscle pain (6 items, $\alpha = .79$), and heart problems (4 items, $\alpha = .79$). Although independent evidence of construct validity is not available for this measure, recent validity evidence for similar symptom checklists suggests that such self-reports are valid (e.g., Kobasa, 1982).

We assessed negative psychological mood (36 items, $\alpha = .93$) by combining responses to four mood indices developed by Zedeck and colleagues (1983)—enthusiasm, tension, tiredness, and irascibility. High scores indicated negative psychological mood.

Behavioral adjustment was assessed by responses to items that asked the employee to report adaptation to shift-induced changes in eating (4 items, $\alpha = .71$) and sleeping (7 items, $\alpha = .73$) patterns, as well as use of alcohol (6 items, $\alpha = .69$). Examples of behavioral adjustment items are: (1) "When you change shifts, how long does it usually take you to adjust to new meal times?" with five choices ranging from "adjust right away" to "never adjust." (2) "Do you take sleeping pills more often when working (graveyard) shift?" (3) "Because of shiftwork, the amount of alcohol you have been drinking has: decreased? remained about the same? increased?" For all indicators of behavioral adjustment, high scores indicated poor adjustment.

Dependent variables. A seven-item index was used to assess employee's dissatisfaction with job/family congruence ($\alpha = .93$). Items asked the employee to use a scale of 1 (very dissatisfied) through 4 (very satisfied) to indicate dissatisfaction with the extent to which the work schedule allowed participation in various family activities, including "time to discuss family and personal problems," "entertaining relatives and friends," "going out together for movies, dinner, etc.," "working and helping around the house," "shopping and relaxing together," and "simply sleeping together." We developed these items based on concerns expressed during pretest interviews of employees at the study site. Items were scored so that high scores indicate high dissatisfaction.

⁴See Zedeck et al. (1983) for a detailed description of how these subscales were developed.

Intentions to leave were assessed by responses to the question, "How likely is it that you will want to be working for (company) two years from today?" We intentionally worded this item to assess employees' desired employment status with the company, because our hypotheses are relevant only for understanding the forces that affect voluntary decisions to leave.

Overall job dissatisfaction ($\alpha = .88$) was assessed by employees' responses to the 20-item Minnesota Satisfaction Questionnaire (Weiss, Dawis, England, & Lofquist, 1967).

Eight items⁵ ($\alpha = .72$) provided measures of quality of family life as reported by spouses or partners. These items asked spouses to describe employees' behavior at home on a 5-point scale. A sample item: "Shift-worker spends a lot of time with family vs. shiftworker wants to be left alone." Jackson and Maslach's (1982) finding that quality of family life as reported by employee's spouse is highly correlated ($r = .46 - .60$) with employee's responses to the same items supports the construct validity of this measure.

Spouse's dissatisfaction with the employee's job was assessed by three items ($\alpha = .69$): "How happy are you with your spouse's or partner's current job?" "If he/she had an opportunity to change occupations (assuming equivalent security and benefits) to a job that does not include work similar to that which he/she is now doing, how much would you want him/her to do so?" and "In general, how happy are you with your spouse's/partner's career at (company)?" Responses for each item were recorded on a 5-point, anchored scale; high scores reflect dissatisfaction.

Data Analysis Procedures

Hypotheses were tested with hierarchical regression analysis of sets of variables (Cohen & Cohen, 1975). For all hypotheses, we entered employee's age and tenure on the job as covariates on the first step in order to control for their effects. We computed three equations to test Hypothesis 1. First, we regressed spouse-reported quality of family life on the two sets of predictors measuring structural and emotional interference. Second, we regressed employee-reported dissatisfaction with job/family congruence on the two sets of predictors. Third, we regressed spouse's dissatisfaction with employee's job on the two sets of predictors. In all three analyses, we controlled for age and tenure and then entered structural interference variables before emotional interference variables, because the former describe more objective conditions.

To test Hypothesis 2, intention to leave was regressed on age and tenure, employee's job dissatisfaction, spouse's dissatisfaction with employee's job, spouse's reported quality of family life, and employee's dissatisfaction with job/family congruence.

⁵Jackson and Maslach (1982) developed these items and described them in detail.

RESULTS

Table 1 shows intercorrelations among the variables assessed in the present study as well as means and standard deviations. Table 2 shows results of the hierarchical regression analyses.

Hypothesis 1 was partially supported. Structural interference explained a significant amount of variance in employee's dissatisfaction with job/family congruence, but was not related to spouse-reported quality of life, or to spouse's dissatisfaction with shiftworker's job. Inspection of the beta weights for the full equation revealed only two of the six types of structural interference to be statistically significant: (1) having a spouse whose work schedule was dissimilar, and (2) commuting time. Emotional interference was significantly related to (1) employee's dissatisfaction with job/family congruence, (2) spouse-reported quality of family life, and (3) spouse's dissatisfaction with the shiftworker's job. A test of Hypothesis 2 replicated past research findings that job dissatisfaction is related to intention to leave. Quality of family life and spouse's dissatisfaction with the shiftworker's job did not improve accuracy of predictions of this intention, however.

DISCUSSION

Past research on the general topic of job stress has focused on the effects of stress-related responses on employees and employing organizations. The present study extends this tradition to an examination of the effects of work-related stress on employees' families. The results of the present study, which were replicated using the self-reports of both employees and their spouses or partners, support the hypothesis that employees' emotional reactions to their jobs carry over into the domain of family activities.

In contrast to the robustness of the evidence supporting the importance of emotional interference, the evidence regarding the hypothesized effects of structural interference was mixed. Structural interference was significantly related to employees' reported dissatisfaction with job/family congruence, but was unrelated to spouse-reported quality of family life and spouses' dissatisfaction with shiftworkers' jobs.

One explanation for the difference in results found for the employee-reported and the spouse-reported data is that shiftworkers and their spouses answered questions about slightly different phenomena: whereas employees indicated their dissatisfaction with the amount of time they had available to engage in various family activities, their partners described the *quality* of interactions that occurred. Apparently, structural interference created dissatisfaction, but this dissatisfaction was not translated into negative behaviors at home.

Our finding that emotional reactions to a work situation are associated with family interaction patterns is evidence against theories that postulate that the worlds of work and nonwork are psychologically separate (e.g., Dubin, 1973), although the correlational nature of this evidence prohibits us from concluding that work-related reactions cause family interaction patterns. It is possible, for example, that family events cause some of the emotional

TABLE 1
Intercorrelations,^a Means, and Standard Deviations for All Variables^b

Variables	Means	s.d.	Intercorrelations															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Demographics																		
1. Employee's age ^c	—	—																
2. Tenure on job ^c	—	—	—															
Structural Interference																		
3. Number of children	3.25	1.13	—34	—39	—													
4. Employed spouse (0 = No, 1 = Yes)	0.59	0.50	02	04	—16	—												
5. Dissimilar spouse schedule (1 = Similar, 3 = Dissimilar)	2.35	1.05	—15	—04	10	22	—											
6. Minutes spent commuting	55.34	40.74	—21	—23	23	03	06	—										
7. Available recreation facilities (1 = Yes, 2 = No)	1.24	0.43	—27	—15	20	—06	00	39	—									
8. Average weekly overtime hours	11.98	23.37	06	12	04	—09	—05	—03	10	—								

TABLE 1 (continued)

Variables	Means	s.d.	Intercorrelations															
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Emotional Interference																		
9. Poor overall health (3 - 12 range)	6.43	1.59	31	32	-12	00	08	-09	06	09	—							
10. Negative mood (0 - 3 range)	1.00	1.20	-12	-13	-02	16	03	12	06	01	21	—						
11. Poor behavioral adjustment (1-4 range)	1.66	0.41	07	15	-03	02	25	06	09	-02	47	46	—					
Dependent Variables																		
12. Dissatisfaction with job/family congruence (1-4 range)	2.20	0.80	34	25	12	10	46	34	23	-05	22	14	31	—				
13. Spouse reported quality of family life (12-60 range)	22.16	5.35	-05	00	07	02	19	01	05	08	32	39	47	35	—			
14. Spouse dissatisfaction with employee job	8.35	2.58	06	15	-02	08	06	00	18	03	28	21	36	33	41	—		
15. Intention to leave	1.94	0.99	-03	-05	-09	-05	02	06	35	12	24	07	07	21	16	14	—	
16. Overall job dissatisfaction (MSQ) ^d	65.39	13.01	-27	-16	09	06	30	18	12	-04	16	32	34	37	18	19	27	—

^aDecimals omitted from correlation coefficients.^bN = 95.^cAge and tenure were assessed as categorical rather than continuous variables.^dMinnesota Satisfaction Questionnaire.

TABLE 2
Results of Hierarchical Regression Analysis for All Variables

Dependent Variables Sets of Independent Variables	R^2	F_R	ΔR^2	$F_{\Delta R^2}$
Spouse-reported quality of family life				
Demographics ^a	.01	0.36	—	n.s.
Structural interference ^b	.05	0.57	.04	n.s.
Emotional interference ^c	.31	3.33*	.26	11.25*
Employee's dissatisfaction with job/family congruence				
Demographics	.12	6.07*	—	6.07*
Structural interference	.37	6.28*	.25	5.72*
Emotional interference	.46	6.50*	.09	4.71*
Spouse's dissatisfaction with employee's job				
Demographics	.03	1.65	—	n.s.
Structural interference	.08	0.91	.05	n.s.
Emotional interference	.20	1.84	.12	8.03*
Employee's intention to leave				
Demographics	.00	0.20	—	n.s.
Employee's job dissatisfaction	.09	2.83*	.09	9.01*
Spouse's dissatisfaction with employee's job and spouse-reported quality of family life	.10	1.97	.01	n.s.
Employee's dissatisfaction with job/family congruence	.11	1.85	.01	n.s.

^aThe two demographic variables included in the set for all equations were employee's age and tenure on the job.

^bThe set of structural interference predictors included six variables: number of children, spouse's employment status, dissimilarity of spouse's schedule, time commuting, unavailability of recreation facilities, overtime hours.

^cThe set of emotional interference predictors included three variables: physical health, negative psychological mood, and poor behavior adjustment.

* $p < .05$

reactions we assessed (cf. Holmes & Rahe, 1967; Kanter, 1977). However, Table 1 provides evidence against this argument. If the relationships between quality of family life and emotional reactions are due to effects of family events on emotional reactions, the correlations with quality of family life should be high for the emotional reactions that do not specifically refer to work—physical health and psychological mood—but should be nonsignificant for the behavioral adjustment subscale containing items that specifically refer to how an employee reacts to a shift schedule. As Table 1 reveals, this is not the case: the correlation between spouse-reported quality of family life and employee-reported behavioral adjustment is significant ($r = .47, p < .05$), as are the correlations between spouse-reported quality of family life and employee's physical health ($r = .32, p < .05$) and psychological mood ($r = .39, p < .05$).

Although the present study provided evidence for a link between on-the-job experiences and family life, it did not support the hypothesis that inten-

tions to leave a job increase in response to family disruption—the only significant predictor of such intentions was employees' job dissatisfaction. The finding that quality of family life does not predict intention to leave should not be interpreted as indicating that quality of family life is of no importance to employers, however.

As Caplan (1976) pointed out, the family is an important source of potential support for workers who experience excessive stress, support that can help shield shiftworkers from the negative effects of their jobs (House & Wells, 1978; LaRocco, House, & French, 1980). But if negative effects of the employees' jobs reach their families, families may find it difficult to be supportive. To date, neither organizations nor organizational researchers have paid much attention to this interdependency between job and family experiences. Future research in this area may reveal that, just as an employing organization can be both beneficial and detrimental to family life, an employee's family can either support or disrupt desirable employee behavior.

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EFFECTS OF GENDER ON LEADERS' RESPONSES TO POOR PERFORMERS: AN ATTRIBUTIONAL INTERPRETATION

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The present study investigated the effects of leader gender and subordinate gender on the manner in which leaders respond to poor performance by subordinates. Analyses revealed that the gender of the leader exerted a major influence on corrective actions. Implications of the results for leadership research and managerial practice and training are discussed.

Recent research has applied attribution theory to explain organizational phenomenon (Brown, 1984; Cummings, 1982; Lord & Smith, 1983). One such application is the Green and Mitchell (1979) attributional model of leadership, which proposes that a two-step process occurs when leaders respond to poor performers. In the first step of this process, leaders diagnose the cause of a subordinate's poor performance by making a causal attribution. Green and Mitchell, building upon the work of Weiner and his colleagues (Weiner, Frieze, Kukla, Reed, Rest, & Rosenbaum, 1972; Weiner & Kukla, 1970), indicate that leaders typically attribute poor performance to lack of ability, lack of effort, task difficulty, or bad luck. These causal attributions have two dimensions: locus — that is, whether the cause is internal (effort or ability) or external (task of difficulty or luck); and stability — that is, whether the cause fluctuates over time (effort or luck) or remains relatively stable (ability or task difficulty).

The second step in the attributional model of leadership involves the selection of corrective actions. Green and Mitchell propose that the choice of corrective actions is based almost entirely upon leaders' causal attributions. Specifically, they predict that leaders will respond to poor performance attributed to internal factors more intensely than they will to poor performance attributed to external factors. Several recent studies have supported this hypothesis (Dobbins, Pence, Orban, & Sgro, 1983; Green & Liden, 1980; Mitchell & Kalb, 1981; Mitchell & Wood, 1980).

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EFFECTS OF GENDER IN THE ATTRIBUTIONAL MODEL OF LEADERSHIP

Research and model building within the attributional framework of leadership have largely neglected leaders' and subordinates' genders, which is surprising considering that many studies have found differences in causal attributions made for the success and failure of men and women. For example, Deaux and Emswiller (1974) found that men's successes were attributed to ability, but women's successes were attributed to hard work, good luck, or an easy task. Women's failures, on the other hand, were attributed to lack of ability, but men's failures were attributed to bad luck, task difficulty, or lack of effort (Cash, Gillen, & Burns, 1977; Feather & Simon, 1975).

Another body of literature (Nieva & Gutek, 1980) indicates that men are generally evaluated more favorably than women. For example, men job applicants are selected more frequently than equally qualified women applicants for managerial, scientific, and semi-skilled positions (Gutek & Stevens, 1979; Rosen & Jerdee, 1974). Men job candidates are also rated more positively than women candidates on such dimensions as acceptability and service potential (Gutek & Stevens, 1979; Rosen, Jerdee, & Prestwich, 1975). These findings strongly suggest that leaders will respond differently toward poor performers who are men than to those who are women:

Hypothesis 1: Leaders will rate different corrective actions as appropriate when responding to men and women subordinates who perform poorly.

Past research has also demonstrated that men and women tend to distribute rewards based upon different norms (Major & Deaux, 1982). In the typical reward allocation study, a group performs a task under the direction of a leader. Following performance of the task, the leader distributes rewards to group members and keeps a portion. Many studies using this methodology have found that allocations made by men and women leaders differ (Austin & McGinn, 1977; Reis & Jackson, 1981). Men leaders tend to distribute rewards based upon a norm of equity — the size of rewards is correlated with the degree to which individuals contribute to group performance — but women leaders typically distribute rewards based upon a norm of equality — the size of rewards is independent of the degree to which individuals contribute to group performance. One implication of such research is that women leaders may respond to all poor performers equally, applying a norm of equality, while men leaders may select corrective actions based upon the cause of poor performance, applying a norm of equity.

Hypothesis 2: Men and women leaders will rate different corrective actions as appropriate when responding to subordinates who perform poorly.

Past research has rarely examined the effects of leader and subordinate gender on the selection of corrective actions. One exception is a preliminary study conducted by Dobbins and colleagues (1983), who presented men and women subjects with a written description of an incident of poor perfor-

mance involving a man or a woman subordinate. Analyses revealed that: (1) leaders responded more punitively toward women than toward men subordinates; (2) men leaders responded more punitively when the cause for the poor performance was internal rather than external; and (3) the punitiveness of women leaders' responses was unaffected by the cause of subordinates' failure.

The present study further explores the effects of the gender of leaders and gender of subordinates on the selection of corrective actions. Men and women leaders supervised the work of a man or a woman subordinate whose poor performance was caused by either an internal-stable cause (lack of ability), an internal-unstable cause (lack of effort), an external-stable cause (task difficulty), or an external-unstable cause (bad luck). Thus, the present study manipulated the gender of leaders and subordinates, the locus of the cause for subordinates' poor performance, and the stability of the cause for subordinates' poor performance. Furthermore, in order to increase the external validity of the findings, the present study was conducted in a simulated work setting.

METHODS

Subjects

Seventy-one men and 77 women undergraduate students served as leaders in the experiment; each subject received extra credit for participating.

Design

The design was a $2 \times 2 \times 2 \times 2$ between-groups factorial experiment, incorporating locus of cause for subordinates' poor performance (internal vs. external), stability of cause for subordinates' poor performance (stable vs. unstable), gender of leaders, and gender of subordinates as independent variables. The number of subjects in each treatment condition ranged from 9 to 12.

Procedures

Subjects supervised the work of subordinates on an "ordering task." It required the transfer of information (e.g., description of items, quantity ordered, price, and index number) to a computerized optical scanning form. This task was selected because of its similarity to many clerical jobs.

Leaders were instructed to "train and motivate the subordinate to perform effectively," with effective performance defined as completion of 14 or more optical scanning forms with less than five errors during a 15-minute work session. Pretesting revealed that supervisors perceived this definition as realistic. Training sessions lasted approximately 15–25 minutes.

Following their training session, subordinates completed a 5-minute practice trial and a 15-minute work session; supervisors evaluated the work subordinates had completed, gave feedback on their performance to subordinates, and then completed a questionnaire that contained manipulation checks and potential corrective action measures.

The subordinates, who were confederates of the experimenter, were described to subjects as undergraduate students. Subordinates always completed 11 forms and made 11 errors, thus performing unsatisfactorily.

Manipulation of the Cause for Poor Performance

Manipulation of the cause for poor performance occurred during the performance feedback session. Subordinates responded in a manner that led supervisors to attribute poor performance to a factor that was either internal-stable (lack of ability), internal-unstable (lack of effort), external-stable (task difficulty), or external-unstable (bad luck). Subordinate responses that were used in the four cause conditions were constructed on the basis of the antecedent conditions delineated by Weiner (1980):

Internal-stable cause: "I worked hard, but I'm really not good at tasks that require working with numbers. I once worked at a drug store and was responsible for filling out inventory sheets. I made so many errors that they moved me to the soda fountain."

Internal-unstable cause: "I guess that I could have worked harder on the task. I could have applied myself a little bit more."

External-stable cause: "I'm normally pretty good at clerical type tasks, but the ordering task was really difficult. It was very easy to skip or miscode a number."

External-unstable cause: "I worked real hard on the ordering task, but had difficulty concentrating since I was up until about 4:00 a.m. last night studying for a test. It was just a bad day for me. I would do much better on any other day."

Confederates were trained to ensure that their responses were equivalent and were perceived as natural and realistic by supervisors. Pretesting and post-experimental interviews revealed that the manipulations of the locus and stability of cause were effective.

Dependent Measures

Manipulation checks. Eight questions from Green and Liden (1980) and from Russell (1982) measured leaders' attributions for the poor performance (see Appendix). Responses to 5 items were summed to form a measure of locus ($\alpha = .92$) and responses to 3 others were summed to form a measure of stability ($\alpha = .89$).

Corrective action measures. Supervisors rated the appropriateness of 12 corrective actions on a 9-point Likert scale with ratings anchored by "not appropriate," "moderately appropriate," and "very appropriate." Responses were analyzed using a principal component analysis with a varimax rotation. Results of this analysis, given in Table 1, revealed a 5-factor solution that accounted for 73 percent of the variance in responses. Factor coefficient scores were calculated for each supervisor based upon the factor weights, a procedure that resulted in 5 new dependent measures: Factor I, train the subordinate; Factor II, punish the subordinate; Factor III, monitor the

TABLE 1
Factor Loadings^a of Items Measuring
Appropriateness of Corrective Actions

Items	Factor I	Factor II	Factor III	Factor IV	Factor V
Provide detailed instructions	.84	-.06	.09	-.02	-.17
Provide extensive training	.79	.10	.12	.11	.21
Provide brief training	.78	-.08	.21	-.01	-.28
Decrease pay	-.02	.87	.05	.01	-.07
Provide written reprimand	.04	.71	.13	.42	-.14
Terminate	-.01	.82	-.09	.01	-.07
Monitor	.16	-.04	.90	-.02	-.07
Watch more closely	.16	.08	.85	.21	-.01
Counsel about work standards	.17	-.06	.13	.82	-.05
Verbally reprimand	-.13	.27	.02	.77	-.04
Provide support and sympathy	.04	-.09	-.04	-.10	.86
Take no action	-.36	-.15	-.05	.01	.59

^aLoadings used to interpret factors are printed in boldface type.

subordinate; Factor IV, counsel the subordinate about work standards; and Factor V, provide support and sympathy to the subordinate.

RESULTS

Analyses of variance were conducted on all dependent variables using nonorthogonal statistical procedures in which only unique variance is accounted for in the sums of squares. These procedures were necessary because of the slight differences in cell sizes (Herr & Gaebelein, 1978). Table 2 presents a summary of the results.

Manipulation Checks

Supervisors attributed poor performance more to external factors than to internal factors when the cause was external ($\bar{x} = 35.13$) rather than internal ($\bar{x} = 16.19$). Furthermore, they attributed poor performance to more stable factors than to unstable factors when the cause was stable ($\bar{x} = 20.09$) rather than unstable ($\bar{x} = 13.76$). These results indicate that the locus and stability manipulations were effective.

Corrective Actions

Gender of leader and subordinate affected four of the corrective action measures.

Train the subordinate. The interaction among the leader's gender, subordinate's gender, and stability of cause affected subjects' propensity to train the subordinate (see Figure 1). Simple effects analyses revealed that

TABLE 2
Summary of Significant Results of Analyses of Variance
on All Dependent Variables^a

Dependent Variable	Significant Effects	F ^b
Locus	Locus manipulation	19.94**
Stability	Leader gender	8.46**
	Stability manipulation	29.46**
Train the subordinate	Leader gender × subordinate gender × stability manipulation	4.32*
Punish the subordinate	Leader gender	6.10*
	Leader gender × locus manipulation	5.74*
	Subordinate gender × locus manipulation × stability manipulation	4.10*
Provide support and sympathy to the subordinate	Leader gender × subordinate gender	6.46*
	Leader gender × locus manipulation	3.97*
	Leader gender × stability manipulation	6.84*
	Locus manipulation	6.50*
Monitor the subordinate	Leader gender	4.06*
Counsel the subordinate	Stability manipulation	4.72*

^aTo save space, only significant results are reported.

^bWith 1,133 *df*

**p* < .05

***p* < .01

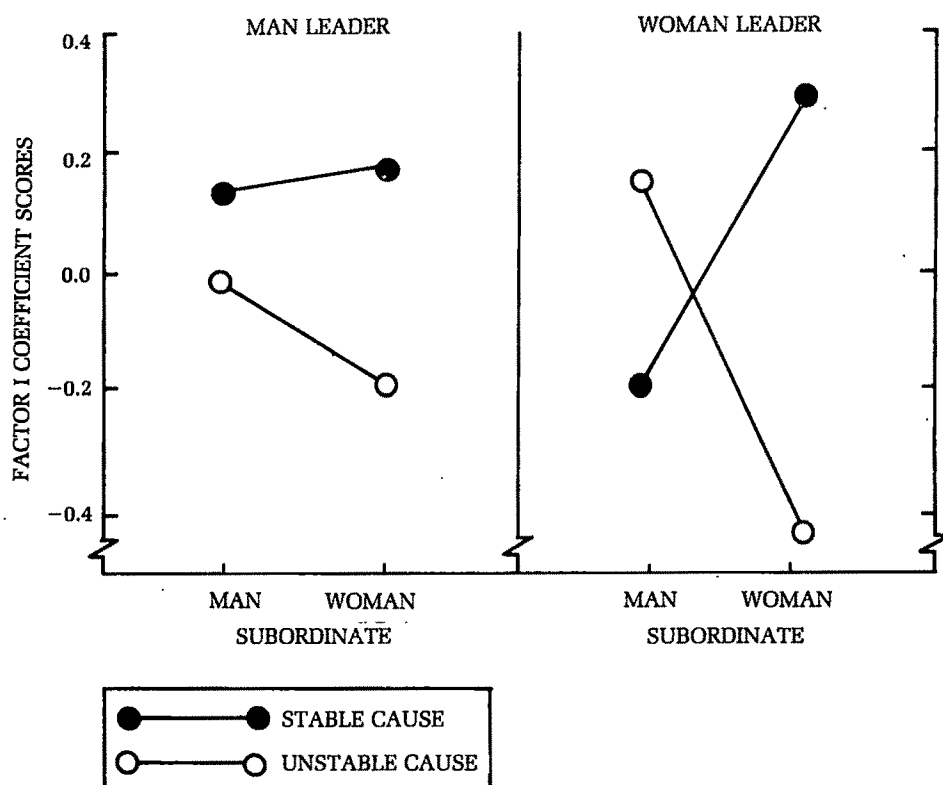
women leaders felt it was appropriate to train women subordinates when the cause for poor performance was stable rather than unstable.

Punish the subordinate. Leader's gender and locus of cause interacted to affect subjects' ratings of the appropriateness of punishing the subordinate. Men leaders responded more punitively toward subordinates when the cause for poor performance was internal than when the cause was external; women leaders, on the other hand, responded with equal punitiveness to internal and external causes.

Subordinate's gender, locus of cause, and stability of cause also interacted to affect the propensity to punish the subordinate (see Figure 2). Simple effects analyses revealed that leaders felt it was more appropriate to punish a man subordinate when the cause for poor performance was external-unstable (bad luck) than when it was external-stable (task difficulty).

Provide support and sympathy to the subordinate. Interactions between these pairs of variables — leader's gender and subordinate's gender, leader's gender and locus of cause, and leader's gender and stability of cause — significantly affected ratings of the appropriateness of providing support and sympathy to the subordinate. Men leaders were equally supportive of men and women subordinates ($\bar{x} = .104$ and $\bar{x} = -.113$, respectively) while women leaders were more supportive of women than men subordinates ($\bar{x} = .269$ versus $\bar{x} = -.186$, respectively). In addition, men leaders indicated that supporting the subordinate was more appropriate when the cause was stable

FIGURE 1
Interaction of Leader's Gender, Subordinate's Gender,
and Stability of Cause on Leader's Ratings
of Appropriateness of Training the Subordinate.

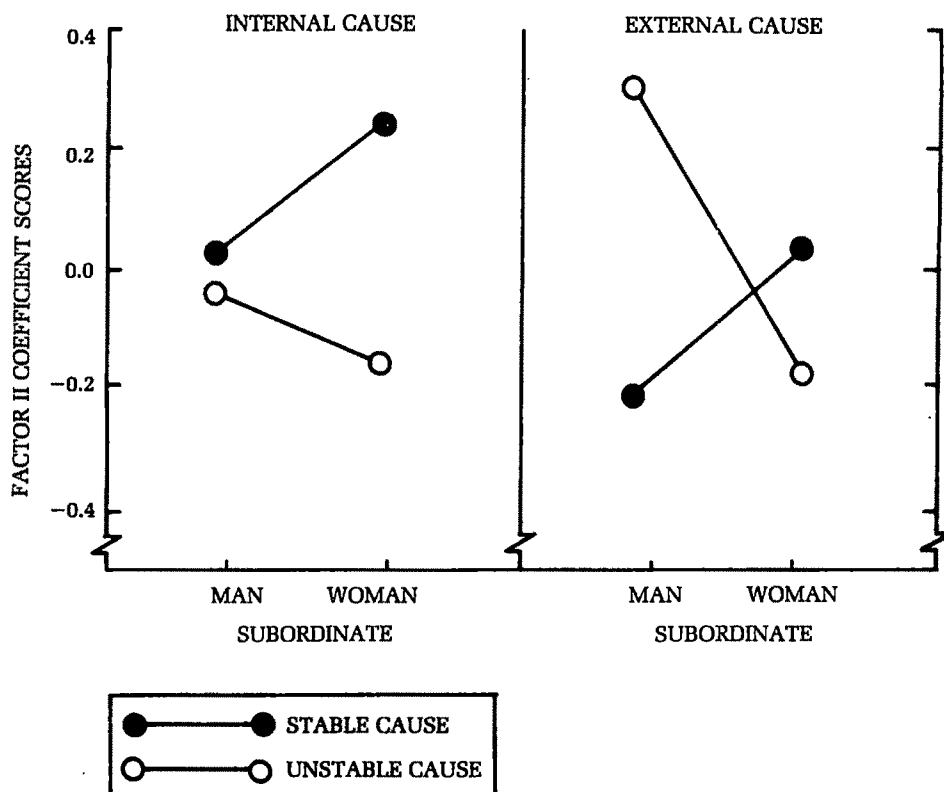


than when it was unstable ($\bar{x} = .266$ versus $\bar{x} = -.286$, respectively) and also when it was external rather than internal ($\bar{x} = .304$ versus $\bar{x} = -.292$, respectively). Women leaders, on the other hand, indicated that providing support to the subordinate was equally appropriate for internal, external, stable, and unstable causes ($\bar{x} = .002$, $\bar{x} = .078$, $\bar{x} = -.023$, and $\bar{x} = .113$, respectively).

Monitor the subordinate. A main effect for leader's gender was found on the dependent measure, monitor the subordinate: men leaders felt this corrective action was more appropriate than did women leaders.

Counsel the subordinate about work standards. Only the stability manipulation affected ratings of counseling the subordinate about work standards: leaders rated this corrective action as more appropriate when the cause for poor performance was unstable than when it was stable.

FIGURE 2
Interaction of Subordinate's Gender, Locus of Cause,
and Stability of Cause on Leader's Ratings of
Appropriateness of Punishing the Subordinate



DISCUSSION

The general pattern of results provides strong support for Hypothesis 2. As predicted, the gender of the leader affected the selection of corrective actions. The gender of the subordinate, on the other hand, exerted very little influence on leaders' ratings of the appropriateness of corrective actions, thus failing to support Hypothesis 1.

Before the theoretical and applied implications of the findings are considered, several limitations should be noted: (1) the length of the leader-subordinate interaction was much shorter than that typically found in work groups; (2) leaders were undergraduate students with little supervisory experience; and (3) the dependent measures were ratings of appropriateness instead of actual behaviors. However, it should also be noted that the present study was conducted in a setting that was much more realistic than that of

typical attributional leadership studies (Dobbins et al., 1983; Green & Liden, 1980). Furthermore, the basic attribution and evaluation processes that were investigated in the present study are likely to exhibit certain commonalities whether they occur in the laboratory or in an organizational setting.

Implications for Research on Leadership

The results strongly indicate that, contrary to current arguments (Butterfield & Powell, 1981; Osborn & Vicars, 1976), men and women leaders differ in one important aspect of leadership: their response to poor performers. In the present study, men leaders rated punish the subordinate as more appropriate when the cause was internal rather than external and rated action providing support and sympathy to the subordinate as more appropriate when the cause was external rather than internal. Women leaders' ratings of these corrective actions, on the other hand, were less affected by the cause of a subordinate's poor performance, but were biased by the subordinate's gender.

The above findings support the hypothesis that the responses of men and women leaders to poor performers are based upon different norms. Men leaders' responses appear to be based upon a norm of equity: thus, men leaders are inclined to punish subordinates who perform poorly because of lack of effort and to train subordinates who perform poorly because of lack of ability. Women leaders' responses, on the other hand, appear to be based upon a norm of equality: they are equally likely to punish or to train subordinates who perform poorly because of lack of effort or lack of ability and may, in fact, select a corrective action based upon an irrelevant factor such as the subordinate's gender.

The equity/equality distinction may indicate a difference in preferred style of interaction that emerges through socialization (Deutsch, 1975; Hennig & Jardim, 1977). Leaders whose orientation is based on a norm of equity define leader-subordinate interactions in terms of a comparison of payoffs and performance. Men leaders may prefer this orientation since they are taught to value achievement, performance, and contributions to team accomplishment. With the equality leadership orientation, on the other hand, leaders minimize status differences and have interpersonal harmony as a goal. Performance becomes an irrelevant dimension and "egalitarian leadership" occurs. Women may prefer this orientation since they are often socialized to value interpersonal aspects of a relationship and to strive for group harmony.

Implications for Management Practice and Training

The equity/equality distinction would seem to have serious consequences for organizational effectiveness. The equality strategy of women leaders may produce feelings of inequity on the part of subordinates, which could in turn produce dissatisfaction, absenteeism, and turnover (Weick, Bougon, & Maruyama, 1976). Furthermore, selection of corrective actions on the basis of the gender of subordinates or other factors unrelated to the cause of poor

performance would; in all probability, not improve a worker's output. Thus, the equality style of a woman leader could have dysfunctional consequences for an organization.

Research in several areas indicates that the process by which individuals make attributions can be altered (Dweck, 1975). Such findings offer the possibility of developing an attributional training program for managers. In this program, the tendencies of women leaders could be discussed and the consequences of these actions considered. Sample cases could be presented so that leaders could practice making accurate causal attributions and selecting the most effective corrective action. Such a program could also discuss factors (e.g., gender of subordinates) that may bias attributions and corrective actions. It is hoped that such a leadership training program would result in both men and women leaders making more accurate causal attributions and responding more effectively to poor performers.

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APPENDIX

Eight attribution measures were included in the questionnaire:

Five measured the locus of cause for subordinates' poor performance: (1) to what extent was the subordinate's performance caused by his or her personal characteristics; (2) to what extent was the subordinate's performance caused by characteristics of the situation; (3) to what extent was the cause of the subordinate's performance something that reflects an aspect of the situation; (4) to what extent was the cause of the subordinate's performance inside the subordinate; and (5) to what extent was the cause of the subordinate's performance something about the situation.

Three additional questions measured the stability of the cause for subordinate poor performance: (6) to what extent was the cause of the subordinate's performance temporary; (7) to what extent was the cause of the subordinate's performance stable over time; and (8) to what extent was the cause of the subordinate's performance unchangeable.

All responses to attribution questions were made on 9-point Likert scales, with items 1, 4, and 6 reverse-scored.

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AN EXAMINATION OF CONFLICTING FINDINGS ON THE RELATIONSHIP BETWEEN JOB SATISFACTION AND ABSENTEEISM: A META-ANALYSIS

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This study, which applied meta-analytic procedures, found a significant negative relationship between certain facets of job satisfaction and absenteeism. Findings suggest that sampling errors, scale inadequacies, and the use of different measures of job satisfaction and absence are the reasons for inconsistencies in previous empirical research that examined the relationship between job satisfaction and absenteeism.

Much organizational research has focused on a hypothesized relationship between job satisfaction and work-related employee behaviors (Locke, 1976). Although researchers have largely discredited the once popular notion of a positive relationship between satisfaction and productivity, they have generally thought job satisfaction to be inversely related to absenteeism (Brayfield & Crockett, 1955; Herzberg, Mausner, Peterson, & Capwell, 1957; Johns, 1978; Muchinsky, 1977; Porter & Steers, 1973; Vroom, 1964; Waters & Roach, 1971, 1973). A frequent explanation for this inverse relationship is a hedonistic calculus: employees will withdraw, or be absent, from a work situation that is painful and dissatisfying.

In recent years scholars have questioned the nature of this relationship. Nicholson, Brown, and Chadwick-Jones (1976), Ilgen and Hollenback (1977), and Chadwick-Jones, Nicholson, and Brown (1982) reported finding only a weak relationship, at best, between job satisfaction and absenteeism. Indeed, after reviewing the inconsistent research findings of studies dealing with the relationship between these two variables, and conducting their own absenteeism study, Nicholson and colleagues concluded that the theory that an undesirable work situation causes absenteeism has little empirical support.

An alternative hypothesis advanced by Steers and Rhodes (1978), Cheloha and Farr (1980), and Clegg (1983) is that the relationship between job satisfaction and employee absenteeism is not direct. Instead, they suggested that biographical and situational variables, such as job involvement, moderate it.

Given the conflicting theories and inconsistent empirical evidence, we question the viability of withdrawal theory as an explanation of employee absenteeism. However, such a morass of mixed results is a fertile area in which to employ a relatively new methodology called meta-analysis (Hunter,

Schmidt, & Jackson, 1982), a form of data synthesis that provides a systematic procedure for quantitatively combining the results of existing empirical studies. Researchers have always combined or synthesized such results, but in most cases have employed no formal methodology in the process. Consequently, the validity and reliability of these idiosyncratic efforts are questionable (Pillemer & Light, 1980).

The job satisfaction and absenteeism literature contains such unsystematic reviews that it is not surprising that they provide different interpretations of the relationship between these two variables. For instance, Muchinsky (1977) concluded that a relationship between job satisfaction and absenteeism does exist; Nicholson and colleagues (1976) concluded that such a relationship does not exist; and Steers and Rhodes (1978) suggested that undiscovered moderator variables may cause the mixed findings. Given these conflicting results, a formal, systematic review of this empirical literature has two purposes: (1) to determine if job satisfaction and absenteeism are negatively related, and (2) to identify variables that may moderate this relationship.

METHODS

Meta-analysis

There are four generally accepted strategies for formal data synthesis: (1) conducting a combined significance test from summary statistics; (2) computing an average effect size; (3) investigating interactions between study attributes and outcomes; and (4) comparing similarly labeled treatments (Pillemer & Light, 1980). The present study uses the second method, determination of an average effect size, as described by Hunter and colleagues (1982). This technique, suited for use with correlational data, has been applied by Fisher and Gitelson (1983) in a recent review of the role conflict and ambiguity literature.

The first step in conducting a meta-analysis is compiling empirical studies pertaining to the issue of concern. Ideally, researchers should collect and analyze the results of all studies from the defined population; however, some studies cannot be used because they do not report the statistics necessary for this type of analysis. Fortunately, a complete sampling of the population is not necessary since, as Hunter and colleagues pointed out, meta-analytic procedures are "valid even for 'convenience' samples that just happen to lie at hand" (1982:29). If the corrected standard deviation suggests that variation across studies is due to sampling errors, additional studies will not affect the findings. But reliance on a convenience sample always involves some risk—the risk of incorporating bias is of special concern where an investigator may have systematically excluded certain works that others would have added to the population of studies. Thus, although use of a convenience sample will not in and of itself invalidate results of a meta-analysis, a complete review of the relevant literature should be undertaken whenever possible.

The second step involves examining the key statistics—here, the product-moment correlation—across all the studies. Third is calculating an average mean value, weighted by sample size, for the product-moment correlation across all studies to serve as a good estimate of the underlying population value. Use of the population parameter is necessary to eliminate the effect of sampling error from the meta-analysis. Since sampling error cancels out in an average correlation across studies, the best estimate of the mean population correlation is simply the mean of the sample correlations.

Fourth, because sampling error adds to the variance of correlations across studies, analysts must correct the observed sample variance by subtracting the error variance—that is, variance caused by sampling errors. This difference is the variance of population correlations across the studies. The fifth step is correcting the mean and variance of the population values for effects of measurement error and range variation. Reporting error, which includes incorrect computations, typographical errors, and the like, is the only major source of variation left uncorrected.¹

Hunter and colleagues (1982) argued that sampling error is the most prevalent and often the only reason for conflicting findings among empirical studies. Hence, before researchers conducting meta-analysis attempt to find variables that moderate or attenuate a relationship of interest, they must first correct for sampling error. If this correction eliminates all unexplained variance, there is no reason to search for moderator variables. Large differences remaining among studies after correcting for this artifact still only suggest that moderator variables are present; researchers should eliminate other sources of variance, such as errors of measurement, before looking for moderators. If all sources of error that can be corrected have been, and unexplained variance still remains, a search for moderator variables is appropriate. To determine the effect of these variables, a researcher divides the sample of studies into subsets on the basis of suspected moderators and applies meta-analytic procedures separately to each subset. Large mean differences between the subsets and a corresponding reduction in within-subset variation across studies provides evidence supporting a moderator effect. How much of this residual variation is caused by artifacts can then be determined through standard meta-analytic procedures (Hunter et al., 1982).

Sample

A comprehensive review of the job satisfaction and absenteeism literature uncovered 23 studies that reported the information needed for meta-analysis: (1) the product-moment correlation between satisfaction and absenteeism; (2) a sample size for each correlation; and (3) identification of the absence measure—frequency, duration, or both. A listing of these studies appears in Table 1. Since most studies used multiple measures of job satisfaction or absenteeism, we extracted 114 correlation coefficients. Of these, 34

¹Hunter and colleagues (1982) contains a detailed discussion of procedures for meta-analysis.

TABLE 1
Studies Used in the Meta-Analysis

Alder & Golan (1981)	Kerr et al. (1951)
Breaugh (1981)	Lundquist (1958)
Clegg (1983)	Nicholson et al. (1977)
Cheloha & Farr (1980)	Popp & Belohlav (1982)
Dittrich & Carrell (1979)	Rousseau (1978)
Fitzgibbons & Moch (1980)	Talacchi (1960)
Garrison & Muchinsky (1977)	Terborg (1982)
Hammer et al. (1981)	Vroom (1962)
Ilgen & Hollenback (1977)	Waters & Roach (1971, 1973, 1979)
Jamal (1981)	Watson (1981)
Johns (1978)	

(29.7 %) indicated a statistically significant (at least $p < .05$) relationship between satisfaction and absenteeism.

Even though meta-analytic formulae assume that correlations are statistically independent, some of the coefficients used in this study lack such independence. In this situation an analyst can either determine an average correlation for each study to use in meta-analysis, or violate the assumption of independence. After considering the advantages and disadvantages of each procedure (cf. Hunter et al., 1982), we elected to treat each correlation as an independent estimate of the relationship between job satisfaction and absenteeism. By so doing, we underestimated the size of the sampling error our sample of studies contains.

This was, in essence, a somewhat conservative approach to this type of analysis, in the sense that its procedures call for subtracting error variance from observed sample variance to show remaining unexplained variance. Thus, underestimating the sampling error means increasing the amount of unexplained variance. If, however, sampling error is as prevalent a problem as Hunter and colleagues (1982) have suggested, meta-analysis would still identify the effects of this artifact on the variance in results across studies despite any underestimation created by using some nonindependent samples.

The studies our research examined measured job satisfaction with several different instruments. Six studies used the Job Descriptive Index (JDI); two used the 20-item short form of the Minnesota Satisfaction Questionnaire (MSQ), and one study employed the complete version of the MSQ; another study used both the JDI and the 20-item MSQ; three studies used the GM Faces scale; two used the Job Diagnostic Survey (JDS); seven studies either did not give the name of their instrument or used a unique scale developed by the investigator (self-developed); finally, one study used both the JDI and the GM scales. We did not collapse the five facets of the JDI into a single scale for purposes of this meta-analysis, but treated each as a different measure of job satisfaction, as Smith, Kendall, and Hulin (1969) suggested. However, when any of the studies examined herein reported a JDI total score, we included this correlation in our analysis.

Absenteeism was measured in two basic ways: in 74 (64.9%) cases, job satisfaction was correlated with absence duration, and in 40 (35.1%) cases, job satisfaction and absence frequency were correlated. Definitions of duration and frequency were fairly consistent among all the studies. Duration referred to total amount of absence expressed in either hours or days, during a specific time period; this interval varied from 11 to 21 months. Frequency denoted the total number of occasions on which employees failed to report for scheduled work; studies reported frequency data for periods ranging from 11 consecutive weeks to 12 months. If an employee were absent for one day, then two days, during a given period of time, the duration would be three days and the frequency would be twice. Although what different organizations count as absences varies, most organizations do not include such events as vacations, holidays, funerals, military duty, educational leave, and jury duty in their calculations.

Sources of the absenteeism data that appeared in sample studies also varied. In 103 (90.3%) cases, employee attendance data came from official company records; in 9 (7.9%) cases, this data came from the employees themselves; and in 2 (1.8%) cases, researchers did not provide the source of this data.

RESULTS

The initial analysis of this data was performed on the full set of 114 correlation coefficients. In Table 2, which shows the results of this analysis, column 1 gives the names of the variables of interest, and column 2 contains the mean correlation weighted by sample size.² Column 3 provides the number of correlation coefficients included in this analysis, with column 4 indicating the number of statistically significant correlations.

The columns of interest for the meta-analysis are the last five. Column 5, labeled sample variance, contains the total observed variance in the sample correlations. The sixth column, error variance, gives the variance that can be attributed to sampling error. We subtracted error variance from sample variance to determine the remaining unexplained variance (column 7). Column 8 indicates how much of the sample variance is ascribable to problems of measurement reliability. Column 9 reports the results of a chi-square approximation test used to determine the significance, if any, of the unexplained variance (cf. Marascuilo, 1971); this is the same chi-square procedure Fisher and Gitelson (1983) used for a meta-analysis of the role conflict and ambiguity literature. However, the chi-square test used here is not the significance test Hunter and colleagues (1982) used; as those investigators pointed out, their test is so powerful that it may identify unexplained variance of even trivial magnitude as significant, hence, they advised against its use.

According to Hunter and colleagues (1982), correlation coefficients are subject to three sources of error: sampling error, error of measurement, and

²As there were differences in sample sizes, we used a weighted correlation to reflect the relatively greater reliability of the larger samples.

TABLE 2
Results of Analysis of Full Data Set

Relationship Investigated	<i>r</i>	Number of Correlations	Number of Significant Correlations	Sample Variance	Error Variance	Unexplained Variance	Measurement Variance	Chi-square
Absenteeism with job satisfaction	-0.146	114	34	0.01764	0.00578	0.01186	0.00151	357.243*

* $p < .05$

TABLE 3
Results of Analyses with Absence Measures as Moderators

Moderator Variables	<i>r</i>	Number of Correlations	Number of Significant Correlations ^a	Sample Variance	Error Variance	Unexplained Variance	Measurement Variance	Chi-square
Duration	-0.088	74	10	0.01496	0.01008	0.00488	—	110.984*
Frequency	-0.181	40	23	0.01593	0.00322	0.01271	0.00190	206.481*

* $p < .05$

^aNote that the number of significant correlations decreased from 34 to 33. One study that used absence duration employed the Job Diagnostic Survey (JDS) to measure job satisfaction. Since meta-analysis requires a minimum of two studies per scale, the JDS results had to be deleted.

range variation. Our analysis corrected the first two sources of error, but there were insufficient data reported in the subject studies to allow for the range variation correction. We found that of the total variance of sample correlations (0.01764, column 5), 32.8 percent (0.00578) was due to sampling error.

Use of three reliability estimates of absence measures provided by Chadwick-Jones, Brown, Nicholson, and Sheppard (1971) and by Waters and Roach (1973), as well as use of the 30 job-satisfaction reliability estimates of Terborg, Lee, Smith, Davis, and Turbin (1982), made corrections for errors of measurement possible. According to Hunter and colleagues (1982), use of unreliable measures will cause the correlation between variables of interest to be systematically lower than the correlation between the true scores. Moreover, a certain amount of sample variance across studies is due to variation in reliability from one study to the next.

Making this reliability correction indicated that 0.00151 (8.6%) of the sample variance was due to reliability problems with the measures of absenteeism or job satisfaction. We also determined that if absenteeism and satisfaction were measured with perfectly reliable instruments, the mean correlation between these variables would be -0.29 . In this sample, however, the mean correlation was only -0.15 (column 2), a depressed figure largely explained by errors of measurement—that is, unreliability.

Even though sampling errors and problems of reliability are the two largest sources of variation among studies (Hunter et al., 1982), corrections for both of these artifacts account for only 41.4 percent of the total variance in the sample correlations. This much unexplained variance would seem to indicate the presence of some variable acting to moderate the relationship between employee absenteeism and job satisfaction. Potential moderators include the different measures of the absence constructs and job satisfaction used. Consequently, we divided the total sample into subgroups on the basis of which absence measure, frequency or duration, a study used. Table 3 provides a summary of the results of this analysis.

When the total collection of studies is subdivided in such a manner, a moderator variable will show itself in two ways: (1) the average correlation will vary from subset to subset, and (2) the average unexplained variance will be lower in the subsets than for the data as a whole (Hunter et al., 1982). Both of these conditions occurred when we formed subsets on the basis of the type of absence measure used. For instance, the mean correlation for the relationship between absence duration and job satisfaction is -0.088 , and the mean for frequency and satisfaction is over twice as large (-0.181). Similarly, when a pooled estimate—a form of average—of the common unexplained variance is calculated from both samples, the resulting unexplained variance of 0.00761 is lower than the unexplained variance (0.01186) for the entire data set. It appears that type of absence measure does moderate the relationship between absenteeism and job satisfaction.

Of course, in the full data set corrections were made for both sampling error and errors of measurement before moderator analysis. However, when

the data were divided into absence duration and frequency subsets, sampling error was the only artifact we could correct. Indeed, only one reliability estimate for the duration measure emerged, and since meta-analysis requires a minimum of two estimates to correct for problems of unreliability, this correction was not possible. Correcting the correlation between job satisfaction and absence frequency for errors of measurement also was impossible, since all estimates of satisfaction scale reliability came from studies that used absence duration as their attendance measure.

Having made the correction for sampling error, we found that the influence of this artifact varied between the frequency and duration subsets. Although sampling error accounted for 67.4 percent of the variance in results of the studies that used absence duration, it is responsible for only 20.2 percent of the variance in the studies that used frequency of absence.

Despite the correction for sampling error, the amount of unexplained variance in both of the subsets was still statistically significant (column 9 of Table 3). This fact justified a search for other variables perhaps affecting the absence duration-satisfaction and the absence frequency-satisfaction relationships. Given the importance of psychometric adequacy of instruments used to measure job satisfaction in studies like those in our sample, we felt that type of scale could be a potential source of variance. Table 4 provides the results of this analysis.

In column 9 of Table 4, the nonsignificant chi-square values mean that once the effects of error variance—sampling error—have been removed from the sample variance, the remaining unexplained variance is not significant ($p > .05$). Therefore, sampling errors can largely explain differences in results among all studies that measure job satisfaction with the Job Descriptive Index (JDI). Our analysis justifies drawing this same conclusion regarding studies that used absence duration as a dependent variable and measured job satisfaction with the GM-Faces scale, as well as those that used absence frequency and the MSQ. Consequently, the weighted mean correlation (column 3 of Table 4) of these 14 sets of studies represents the best estimate of the population value. Since the unexplained variance for studies using either (1) absence duration and the MSQ, (2) absence frequency and the JDS, or (3) absence frequency and self-developed scales is statistically significant, the mean correlations of these groups cannot be interpreted as parameter estimates.

Following Hunter and colleagues (1982) and Fisher and Gitelson (1983), the next step in this analysis was to determine the statistical significance of these population estimates by converting the values in the unexplained variance column to standard deviations. If the mean correlations in column 3 were more than two standard deviations from zero, we considered these correlations significant. It is worth noting that in 9 of 14 (64.3%) instances in which the unexplained variance was nonsignificant, the mean correlations were significantly different from zero. By contrast, the original set of 114 coefficients contained only 34 (29.7%) statistically significant values.

TABLE 4
Results of Analyses with Satisfaction Measures as Moderators

Measures of Absenteeism	Moderator Variables	<i>r</i>	Number of Correlations	Number of Significant Correlations	Sample Variance	Error Variance	Unexplained Variance	Chi- square
Duration	JDI work	-0.148*	11	4	0.01541	0.01146	0.00395	14.353
	JDI promotion	-0.072*	11	0	0.00939	0.01186	-0.00247	8.232
	JDI supervision	-0.038*	11	0	0.00767	0.01195	-0.00428	6.855
	JDI coworkers	-0.062	11	1	0.01288	0.01189	0.00099	11.596
	JDI pay	-0.068	11	2	0.01676	0.01187	0.00489	15.854
	JDI total	-0.063	5	1	0.00754	0.00646	0.00108	5.692
	MSQ	-0.176	6	0	0.02259	0.00583	0.01676	24.241**
	GM faces	-0.066	7	2	0.01044	0.00882	0.00162	7.993
Frequency	JDI work	-0.336*	5	5	0.00160	0.00754	-0.00594	0.992
	JDI promotion	-0.067	3	0	0.01059	0.00804	0.00255	3.827
	JDI supervision	-0.043*	3	0	0.00669	0.00808	-0.00139	2.418
	JDI coworkers	-0.208*	3	3	0.00061	0.00742	-0.00681	0.221
	JDI pay	-0.155*	3	1	0.00323	0.00772	-0.00449	1.168
	JDI total	-0.250*	6	6	0.00717	0.00818	-0.00101	5.148
	MSQ	-0.203*	3	1	0.00296	0.00799	-0.00503	1.172
	JDS	-0.416	2	1	0.00612	0.00104	0.00508	18.091**
	Self-developed	-0.134	11	6	0.00607	0.00148	0.00459	43.245**

p* < .05*p* < .001

Additionally, as column 3 of Table 4 indicates, there are several differences between the subsets in terms of these significant correlations. Indeed, the two subsets agree only in the sense that in both the relationship between absenteeism and the JDI work and JDI supervision scales is significantly different from zero. Not only is the pattern of significant correlations different, but the magnitude of these coefficients also differs. For instance, the correlation between the JDI co-workers scale and absence duration (-0.062) is only about one-third as strong as the correlation between the same scale and absence frequency (-0.208).

DISCUSSION AND CONCLUSIONS

There is a long-standing belief that job satisfaction is related to employee absenteeism, as withdrawal theory and the numerous studies that have examined this relationship have indicated. Unfortunately, empirical findings have not been consistent, and as a result, the nature of this relationship is uncertain. The purpose of the present study was to clarify the relationship between job satisfaction and absenteeism, and to determine why such contradictory evidence has arisen.

In light of our meta-analysis, a stronger case for a relationship between job satisfaction and absenteeism emerges than previous research has suggested. Specifically, the strongest associations seem to be between (1) employee absenteeism, measured by both absence frequency and absence duration, and satisfaction with the work itself; (2) absence frequency and satisfaction with co-workers; and (3) absence frequency and overall satisfaction. Of course, this does not imply a causal relationship between job satisfaction and worker absenteeism, as correlational analysis does not allow inference of causality.

This analysis seems to indicate that use of overly small samples may have obscured the relationship between employee absenteeism and job satisfaction. The less frequent occurrence of significant findings in studies using absence duration suggests that this measure is more sensitive to sample size than is absence frequency. As Table 3 shows, a statistically significant relationship between job satisfaction and duration of absence existed in 10 out of 74 studies; significant relationships between satisfaction and frequency of absence occurred in 23 out of 60 studies. Furthermore, as Table 4 shows, absence duration is apparently only related to three of the seven measures of job satisfaction that have nonsignificant unexplained variance, whereas six out of the seven job satisfaction scales having nonsignificant unexplained variance have a negative relationship with absence frequency.

The stronger association between job satisfaction and absence frequency—stronger relative to the association between job satisfaction and absence duration—supports Vroom's (1964) hypothesis that absence frequency will be more strongly related to job satisfaction than will absence duration. He argued that short term absences of one or two days are more likely to be at an employee's discretion and are subject to employee abuse. Long term absences,

on the other hand, are more likely to be for reasons outside of employees' control, such as major illness. Because absence frequency measures give more weight to short-term than to long-term absences, and because employees are held less accountable for short absences than for long ones, we would expect absence frequency to capture the type of absenteeism that withdrawal theory predicts. Thus, we might also predict that job satisfaction will be more strongly associated with absence frequency than with absence duration, a finding that supports Smulders' (1980) position that not all measures of absenteeism capture the same phenomenon.

Despite the evidence supporting the significant negative relationship between job satisfaction and absenteeism, certain limitations are inherent in this research. First, we used only individual correlational studies—those that matched absence and job satisfaction scores of individual employees—in this analysis, as these were the only studies that provided the information needed for this type of analysis. Consequently, we left unsampled both criterion or contrasted-group studies, and group correlational studies. Although individual correlational studies tend to be the most methodologically rigorous (Nicholson et al., 1976), questions as to the adequacy of content domain sampling may still arise.

Second, as Fisher and Gitelson (1983) stated, a common argument against the use of only published studies is that unpublished results may have fewer significant findings. As Rosenthal (1979) pointed out, in its most extreme form this argument maintains that journals are filled with the 5 percent of the studies that show Type I errors, while the 95 percent of the studies that show nonsignificant (e.g., $p > .05$) results are consigned to file drawers. Using Rosenthal's (1978, 1979) method, we determined that 9,928 studies with statistically nonsignificant correlations would have to be found to invalidate our conclusion that job satisfaction and employee absenteeism are negatively related.

Finally, although our research indicates that a negative relationship exists between job satisfaction and absenteeism, especially absence frequency, the correlation is only -0.15 , which explains slightly over 2 percent of the total variance. However, as noted earlier in this paper, this relationship is stronger than is apparent in the literature. If perfectly reliable instruments were used to measure job satisfaction and absenteeism, the correlation between them would be -0.29 , which represents almost 9 percent explained variance.

Even though this meta-analytic examination of the research concerning job satisfaction and employee absenteeism offers some support for the traditional notion of a significant negative relationship between these variables, it also raises disturbing questions about research practices in this area. Our analysis indicates that the controversy surrounding the satisfaction-absenteeism relationship may be an artificial one created in large part by the use of insufficient sample sizes and different measures of the phenomena of interest. Controlling for these problems better explains the variance in results among studies. For instance, of the 16 studies using the JDI work scale, 7 reported nonsignificant results, and the other 9 found a statistically significant

relationship. Yet, once we controlled for variance due to sampling error, these different findings could be reconciled. In light of the fact that the entire field of inferential statistics rests on the assumption of correct sampling, the gravity of such poor research techniques is fully evident.

Furthermore, this study indicates that inconsistencies and nonsignificant relationships between variables are not necessarily the result of undiscovered third variable moderators. We considered the effects of moderating variables only after statistical analyses failed to explain a sufficient amount of variance among the studies. This, perhaps, is one of the strongest virtues of meta-analysis—its methodology helps prevent premature searches for moderator influences. Indeed, Hunter and colleagues (1982) argued directly that researchers must correct for statistical artifacts before calling for any moderator analysis. The present study found the inconsistencies among the results of previous inquiries into the relationship between absenteeism and job satisfaction to be accountable to sampling error and use of different measurement instruments.

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GROUP DECISION MAKING UNDER THREAT: THE TYCOON GAME

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The relationship between external threat and group decision-making processes was tested with 24 groups involved in a management simulation called *Tycoon*.¹ Results indicate a restriction in information processing and increased stress when threat is increased, although there was no change in the centralization of influence within the groups. The findings show partial support for the threat-rigidity hypothesis and provide evidence for the usefulness of management simulations as a research methodology.

American corporations have recently experienced increased foreign competition, rapidly changing market conditions, and extensive federal legislation that limits corporate options. Firms must monitor these and other potentially harmful external conditions and react to them quickly, particularly when their freedom or power within their environment is limited (Hrebiniak & Joyce, 1984). Top management teams often determine corporate reactions (Janis, 1982), which underscores the need to examine group decision making under threat. Research by sociologists, political scientists, and psychologists has examined the topic indirectly (e.g., Allison, 1971; Hermann, 1963; Janis & Mann, 1977; Lindblom, 1959); work ranges from a study of major strategic decisions in times of war (Greenbaum, 1979) to a study of laboratory groups' reactions to fire (Latane & Darley, 1968). Recently, theorists have pooled the results of this research with results from studies at the individual and organizational level of analysis to suggest that a common reaction to threat may exist.

This "threat-rigidity" hypothesis (Staw, Sandelands, & Dutton, 1981: 502) posits that external threat leads to restriction in information processing and constriction of control that, in turn, lead to rigidity in response—a tendency toward well-learned or dominant responses (Zajonc, 1965). According to this hypothesis, the dominant responses will be maladaptive if the task or environment has radically changed and adaptive if the causal relationships between process and performance are stable. The present study, which examines the first portion of the threat-rigidity argument, analyzes groups to test

We would like to thank the Tuck OB Research Seminar Series group, Jane Dutton, William Morris, Lance Sandelands, and Barry Staw for their helpful commentary and encouragement.

¹*Tycoon* is a business strategy simulation game that was developed by the Amos Tuck School of Business Administration in 1973.

the relationship between threat and (1) restriction in information processing and (2) constriction of control. Figure 1 shows hypothesized relationships.

REACTIONS TO THREAT

Staw, Sandelands, and Dutton defined threat "as an environmental event that has impending negative or harmful consequences for the entity" (1981: 502). The literature has made little clear cut distinction between threat and a number of related terms, including crisis. Staw and colleagues claimed that threat is a major component of most events that the term crisis attempts to explain.

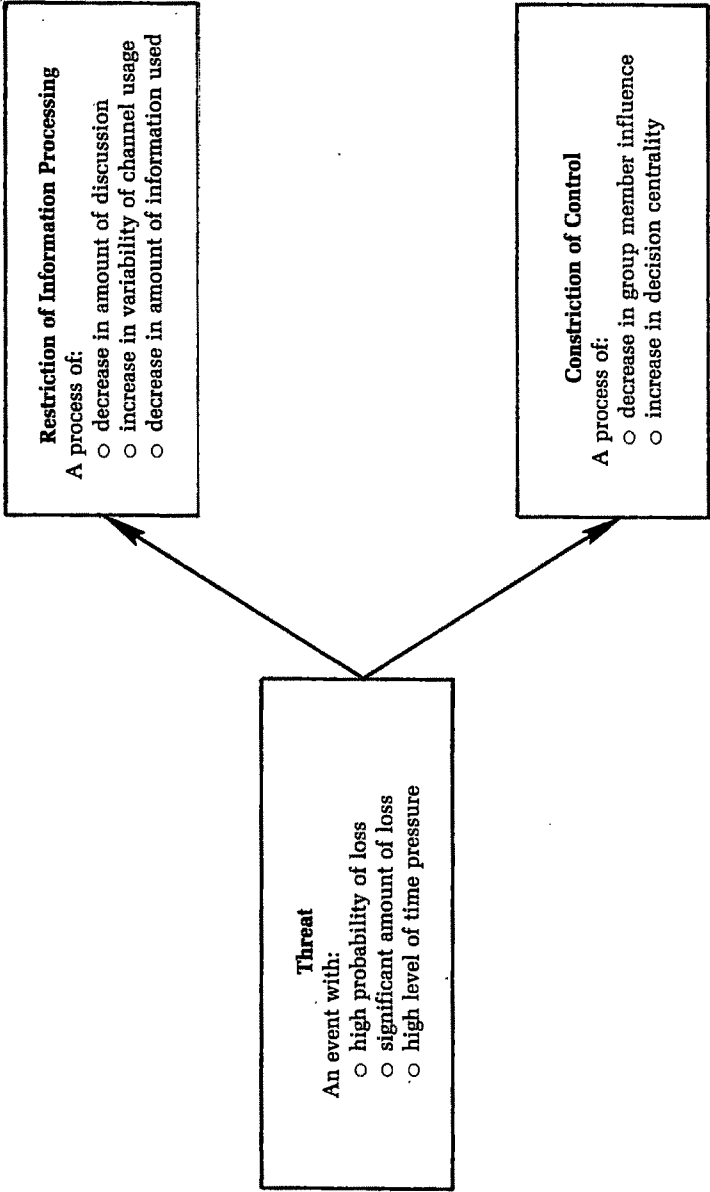
Hermann (1963) characterized a crisis as having three components: (1) it is a major threat to system survival; (2) it allows little time to react; and (3) the threat is unanticipated. Although, subsequent findings reported in the disaster literature have not supported inclusion of the third component, the element of surprise (Billings, Milburn, & Schaalman, 1980; Hermann, 1963; Milburn, 1977), they have suggested that time pressure is a crucial component of crisis.

For our purposes, a threat is an apparently negative triggering event of less intensity than a crisis. Every crisis is a threat, but every threat need not be a crisis. Because of the similarity between the two constructs, however, we include time pressure as a component of threat. Therefore, we propose that the extent to which an event is regarded as threatening depends upon: (1) the probability of loss resulting from that event, (2) the amount of that loss, and (3) the amount of time pressure associated with making some decision—taking some action—as to how to deal with that event.

Threat will produce change in two group processes: the group will restrict information processing and constrict control. Information processing and control correspond to two subsystems, the interaction structure and the decision structure, identified in network research and studies of small group problem-solving (e.g., Harshbarger, 1971). Interaction structure refers to degree of information exchange, and decision structure deals with distribution of power and influence.

In this study, restriction in information processing means a decrease in the degree of information exchange caused by a narrowing of the field of attention and a decline in sensitivity to peripheral cues (Staw et al., 1981). Several conditions might reveal restriction in information processing: (1) less information being shared among all group members; (2) less information exchange in some of the many communication channels within a group; (3) less information being used to make decisions; or (4) some combination of the above. For example, Janis (1982), in his well-known groupthink model, posited that external threat, along with other antecedent conditions, produces changes in a group's decision-making processes. Groups experiencing this phenomenon consider and discuss relatively few alternatives (less information shared), censor the input of dissenting views (less information from certain individuals) and insulate themselves (less information used). No one

FIGURE 1
Relationship between External Threat and Group Process



has fully tested the groupthink model, although several studies have shown partial support for it (Flowers, 1977; Leana, 1983).

In this study, constriction of control means decrease in breadth of distribution of influence. Group members come to believe that they have less influence on final decisions than they had previously; they attribute decision outcomes to chance, previously decided decision rules, or some other causal factor. Influence also becomes more centralized or less equally distributed within the group that it had been. One or two individuals acquire a great deal more influence than others in the group (Harshbarger, 1971). For example, Janis (1982) described top-level decision-making groups as experiencing groupthink when there is a high degree of concurrence with leader opinion. Worchel, Andreoli, and Folger (1977) found that members of competing groups identified fewer members as leaders than did members of cooperating groups. Thus, there is centralization of influence under threat.

In studies of organizations, centralization of authority is a well-documented reaction to crisis (Holsti, 1971; Starbuck, Greve, & Hedberg, 1978; Staw et al., 1981). A decline in the number of participants in decisions and an increase in decision making at upper levels of an organization indicate centralization (Hermann, 1963; Staw et al., 1981). In groups, threat may not increase support of current leadership; rather, another group member may replace the leader (Bion, 1975; Hamblin, 1958; Staw et al., 1981).

Given these conceptualizations, the following propositions result with regard to decision making under threat:

Proposition 1: A high level of threat restricts information processing. An event highly likely to lead to considerable loss that a group must respond to under severe time pressure will (1) decrease the amount of discussion in the group; (2) increase variability of channel usage, so that some channels are used less frequently than they were before; (3) decrease the amount of information used to make a decision.

Proposition 2: A high level of threat constricts control. An event highly likely to lead to considerable loss that a group must respond to under severe time pressure will decrease the perceived influence of the group as a whole over decisions and will increase centralization of influence within the group.

Staw and colleagues (1981) drew on the psychological literature examining stress, anxiety, and arousal, considered to be manipulation checks of whether a threatening event has occurred, to suggest that threat affects stress as well as group processes. Hall and Mansfield (1971), who reported that a threatening external event changes the state of the internal system of either an organization or an individual, viewed internal stress as a reaction to threat. In this study, stress is viewed both as a reaction to threat and as a manipulation check on threat.

Proposition 3: Threat is positively associated with stress in decision making. An event highly likely to lead to considerable loss that a group must respond to under severe time pressure will increase the level of perceived stress.

There are three streams of thought concerning the effects of restriction in information processing and constriction of control on effectiveness. Staw and colleagues (1981) speculated that whether threat-rigidity leads to effectiveness or ineffectiveness depends on the degree of environmental change. Janis (1982) viewed the two processes as having a negative impact on group outcomes in the case of strategic or nonroutine decisions. The communication network approach of the 1950s and 1960s has produced conflicting results from studies of communication patterns and group effectiveness in solving complex problems (Bavelas & Barrett, 1951; Leavitt, 1958). In general, however, studies involving relatively complex problems have found decentralized networks more effective than centralized networks, a finding suggesting that rigidity would be maladaptive in dealing with such problems. Comparisons across 18 studies (Shaw, 1964) showed that decentralized networks required less time and produced more messages, fewer errors, and higher satisfaction among group members than did centralized networks. This evidence suggests that the process-effectiveness relationship remains rather tenuous, in that either environmental change or task complexity may moderate it. Although it is tangential to our proposition, we will briefly explore this link.

For several reasons, the present study uses a management simulation to test the threat-rigidity hypothesis. Difficulties abound in descriptive research on decision-making processes (e.g., Einhorn & Hogarth, 1981), because data must be collected over time, on processes that are difficult to monitor, to ensure adequate reliability. In field work, controlling threat conditions is problematic. Laboratory studies lack external validity, for it is hard to reproduce the complexities of strategic decision making in a laboratory. Simulations, which permit both careful monitoring of a decision-making process and control of external threat, also provide a realistic context for participants (Cameron, 1983; Cameron & Whetten, 1981; Cohen & Cyert, 1965; Pruitt, 1975).

Within the context of a management simulation, we tested the threat-rigidity hypothesis, specified in Propositions 1–3, at a group level of analysis.

METHODS

Simulation

In *Tycoon*, the management simulation used in this study, groups interact for six full days, achieving an intensity not often found in simulations. Initially, each group must buy a company in an open competitive bidding

session. Groups have one day to develop a strategy and a structure before they must begin to make decisions covering all areas of business. Each company has a unique history, so that groups must develop different strategies and structures.

Tycoon is played in discrete time periods, corresponding to yearly quarters, during which participants must enter their decisions concerning raw materials orders, production schedules, finances, construction, pricing and advertising, shipments to warehouses, foreign orders, sales and labor force allocations, etc., into a computer. A set of computer programs that translate data input by companies—represented by groups in the simulation—into output data, according to a priori decision rules, control the game. Output data, which guide the next period of play, include information on market share, sales revenue, and employee attrition. When the game is over, the computer compares and evaluates companies on the basis of their output.

The faculty running the game introduce a wide variety of exogenous events during the game's 13 quarters—for instance, strikes, storms, terrorist attacks, price controls, and tariffs—each of which has predetermined financial consequences for each company. Severe negative financial consequences represent a high impact, and less severe consequences represent low impact. We did not collect data after the tenth decision period because events (kidnapping) occurred that changed the sample by removing group members, nor did we collect data during the first decision period, so that initial start-up confusion would not contaminate it.

Finally, halfway through the game, the time given to groups to reach decisions drops from three hours to 45 minutes, representing a shift from decision making under low time pressure to decision making under high time pressure. The high-time-pressure periods of the game are called the intensive periods, because they force group members to become highly focused in order to accomplish their work in less than one-third the time they had before.

Subjects

The subjects in this study were 128 second-year MBA students at the Amos Tuck School who were enrolled in a business policy course that required participation in the full six-day simulation. The students, 97 men and 31 women, with a mean age of 25.2, self-selected themselves into 24 groups—the companies—of five or six people each. Because of excessive missing data points, we had to eliminate one group's data from our analysis.

Design and Procedure

Level of impact of an event (high or low) was crossed with level of time pressure (high or low); we incorporated this 2×2 factorial in a repeated-measure multivariate analysis of variance design. We took six dependent measures for all companies at the end of each of four decision periods that featured threats with varying profiles: (1) low impact, low time pressure; (2) low impact, high time pressure; (3) high impact, low time pressure; (4) high

impact, high time pressure. The first factor, level of impact, combines the first two components of a threatening event—the probability of loss resulting from that event and the amount of that loss—because the structure of the game precluded separation of these components. This factor, level of impact, was experimentally manipulated. Data were collected both after notification of a high impact event (e.g., a strike, hurricane, or demand from extortionists) and after notification of a low impact event (e.g., notification that an insurance premium was due). Groups were randomly assigned to different orderings of events; i.e., some had high impact events before low impact events, and vice versa. We sampled for the second factor, time pressure, in a quasi-experimental manner, taking measurements for all companies at the end of both a three-hour and a 45-minute decision period, which represented conditions of either low or high time pressure, for each level of impact. This last factor constituted a necessary confound in the design, because we had to work within the structure of game, in which both low-time-pressure conditions always came first.

Thus, each company was assessed in each of four conditions. We predicted that overall level of threat would increase between the cell representing lows for both factors and the cell representing highs for both factors, with the intermediate cells showing no differentiation.

Our dependent measures were self-report scales embedded in a questionnaire that each company member completed at the end of prespecified decision periods. A company's decision was not considered complete until all questionnaires were turned in. Specific questions assessed restriction in information processing, constriction of control, and level of stress, as well as variables not relevant to this study. A final questionnaire, distributed after the game was completed, measured subjective assessments of process changes attributable to threats and general reactions to the game.

Three items in the questionnaire covering amount of group discussion, variability in channel usage, and amount of information used measured restriction in information processing. The first item was amount of discussion within the company, which we measured from group members' responses to the question: "In this decision period, how often did you share work-related information of any kind with each of the other members of your company?" We used the mean of all group members' responses on a 5-point Likert scale, with 1 = not at all and 5 = quite often. In a group of five, each person rated interaction with each of the other four members, so there would be $5 \times 4 = 20$ responses averaged in this measure.

The second item was variability in channel usage, the extent of dispersion of information through communication channels. We obtained this variability measure by averaging across all group members the standard deviations of the five responses given by each group member on the question quoted in the preceding paragraph. High variability scores reflected relatively high dispersion, indicating that some individuals shared a lot of information while others shared little; low variability reflected homogeneity of variance and indicated relatively equal participation.

The third item, amount of information used, indicated whether a company used too much or too little information in making decisions. In Tycoon, group members have access to an abundance of information—the question here was how much they chose to use when facing various levels of threat. Group members answered the questions: “Did you use the appropriate amount of information?” on a 5-point Likert scale, with 1 = too little and 5 = too much information.

Constriction of control included two items: decision influence and decision centrality. To assess individuals’ decision influence, we asked: “In this decision period, how much influence did each company member have in deciding upon the final input information?” We took the mean of all group members’ responses on a 5-point Likert scale ranging from 1 = no influence to 5 = a great deal of influence. In a group of five, each person rated the influence of each group member—including self—so there would be $5 \times 5 = 25$ responses averaged in this measure.

To measure the fifth item, decision centrality, we used the mean amount of influence that each group member was perceived as having by the other members, subtracting all values of that mean from the highest value in the group and adding these differences together. For five person groups, we multiplied scores by a factor of 1.25 to produce a range comparable to that of six person groups. For example, a group having members’ mean amount-of-influence scores of 5,1,1,1,1 would receive a score of $[(5-1) + (5-1) + (5-1) + (5-1)] \times 1.25 = 20$. A high centrality score indicated that a small number of people had a lot more influence than others in the group. The score went down if several individuals shared influence (5,5,1,1,1 produces a score of 15) or if these individuals had only slightly more influence than others (5,5,3,3,3 produces a score of 7.5).

The sixth item was self-reported stress, important both as a reaction to and a conceptual check on our threatening situation. The question: “To what extent were you working under a great deal of strain during this decision period?” was rated on a 5-point Likert scale ranging from 1 = not at all to 5 = to a large extent. For this, as for most other items, we averaged group members’ responses to form group scores.

Several dependent variables were formed from measures of single-items because we were more interested in obtaining convergent measures of the threat-rigidity construct than in increasing validity or reliability for any one single measure. Time and space limitations prohibited our doing both.

RESULTS

Our primary analytic technique was a repeated measure multivariate analysis of variance with two factors determining level of threat and six dependent measures. The overall multivariate F s were significant for effect of level of impact ($F_{6,17} = 2.83, p < .05$); time pressure ($F_{6,17} = 8.21, p < .001$); and the interaction of level of impact and time pressure ($F_{6,17} = 2.87, p < .05$). An examination of the univariate effects further clarifies which propositions received support.

Regarding restriction in information processing, examination of means for amount of discussion yielded two main effects; there was significantly less discussion among group members facing both a high impact event and high time pressure than there was under other conditions. (Results of the univariate analyses were $F_{1,22} = 4.47, p < .05$ and $F_{1,22} = 14.71, p < .001$, respectively.) We also obtained a marginally significant interaction ($F_{1,22} = 3.69, p < .07$). Under low time pressure, a high-impact event decreased the amount of discussion, but under high time pressure, the impact of the event made no difference on the group members. Table 1 shows means for the major analyses.

TABLE 1
Means of Six Dependent Measures
across All Experimental Conditions^a

Dependent Measures	Conditions ^b				Significant Effects ^c
	Low-Low	Low-High	High-Low	High-High	
Amount of group discussion	4.35	3.82	4.09	3.81	L, T
Variability in channel usage	0.65	0.92	0.75	0.89	T
Amount of information used	3.05	2.94	2.85	2.75	L
Decision influence	4.25	4.28	4.12	4.25	
Decision centrality	1.58	1.36	1.99	1.60	
Level of stress	2.66	2.84	2.92	3.75	L, T, I

^a $n = 23$

^bFirst condition given is level of impact of event; second is time pressure.

^cL = Significant main effect for level of impact.

T = Significant main effect for time pressure.

I = Significant interaction.

The second component of restriction in information processing, variability in channel usage, yielded a significant main effect for time pressure only ($F_{1,22} = 33.97, p < .001$). Groups had higher variability scores under high time pressure than under low time pressure, as evidenced by an increase in the size of standard deviations. As you recall, our assumption is that high variability within a group indicates some people sharing a lot of information, and others sharing little.

The third component of restriction in information processing, amount of information used to make a decision, decreased when a group was faced with a high impact event ($F_{1,22} = 6.21, p < .03$). Although not significant, the means for the predicted time pressure effect are in the right direction.

The only evidence for constriction of control within these groups was a marginal main effect ($F_{1,22} = 3.63, p < .07$) for level of impact on decision influence. The average amount of influence attributed to members tended to be less at higher levels of impact.

Results for the stress measure indicated that there was a significant effect for level of impact ($F_{1,22} = 7.78, p < .02$); for time pressure ($F_{1,22} = 9.58, p < .005$); and for their interaction ($F_{1,22} = 5.25, p < .04$). The means show an

increase in stress from the low impact, low time pressure cell through the intermediate cells to the high impact, high time pressure cell. Thus, the experimental manipulations produced an environment whose perceptible variation influenced the internal state of the subjects.

Finally, we performed a post hoc analysis to determine whether high- and low-performing groups differed on our measures. The result of a median split on the final rankings of the companies, determined by a priori criteria, was added to the overall design, and the analyses redone with this between-subjects factor. We obtained no significant differences; results for the threat-rigidity effect held for both high- and low-performing groups.

Subsidiary Analyses

The nonrandom order in which our time pressure factor occurred poses a serious problem for interpretation, for the main effects for time pressure may simply reflect development of groups over time. To test for such confounding, we performed a repeated-measures MANOVA using, instead of the 2×2 design, the four sequential time periods. The overall multivariate F was nonsignificant ($F_{3,20} = 3.67, p < .11$) for group development over time. Also, an analysis of the variables that were significantly influenced by time pressure did not suggest a linear progression over time. Although stress significantly increased with time pressure, its mean value changed from 3.12 to 2.47 to 3.36 to 2.93 as groups moved from time 1 to time 4, suggesting that stress is not associated linearly with group development.

In addition, since the groups had met together for two days before actually starting to make decisions, and since we did not collect data during the first decision period, there is some evidence that the groups had achieved some level of stable functioning by the time we assessed their decision-making processes. Observations indicated that groups rarely changed their organizational structures or strategies, further minimizing the likelihood of any organizational learning effects.

DISCUSSION

Results show partial support for the threat-rigidity hypothesis. It appears accurate to say that an increase in threat not only led to an increase in internal stress, but also restricted the way in which groups processed information. Groups performing a realistic complex task confirmed the hypothesis that members will react to external environmental threat by using less information and fewer communication channels and by having less interaction than they would under nonthreatening conditions. A large number of studies of group decision making have centered on relationships between communication structure and performance (Bavelas, Hastorf, Gross, and Kite, 1965; Harshbarger, 1971; Leavitt, 1958; Shaw, 1964), process-performance relationships (Argyris, 1966; Bales, 1958; Van de Ven, 1974; Zand, 1972), and individual input-process relationships (Myers & Lamm, 1976; Shaw, 1971; Steiner, 1972). This study supports the existence of a

relationship between external environmental events and process that laboratory research has often ignored.

Both MANOVA results and subjective responses of group members on the final questionnaire gave evidence for restricted information processing. Answers given by group members who were asked about their reactions to high impact events and to severe time pressure illustrate the quality of information processing. Some sample answers concerning high impact events: "One person read the newsletter, the effects were discussed, and then each member studied the effects on each functional department"; "The [sub]group responsible just handled it and informed the other members of the consequences of the change for future planning." Concerning high time pressure: "Communication was reduced to the essentials"; "Less group discussion of functional decisions—team members contacted functions only when absolutely necessary." These subjective ratings suggest that restriction in information processing, if it does occur, may result from increased functional specialization, with discussion—which is cut to the essentials—limited to interfunctional areas.

In general, the degree of threat made no significant difference in constriction of control. Subjective responses to the questions mentioned in the previous paragraph also support this MANOVA result. Comments indicate a norm of shared authority in the groups, although some groups reported more centralization than others. Sample answers concerning reactions to high impact events: "Excitement, but we acted quickly and always in unison"; "Leader very quickly made decisions." For high time pressure: "The group worked well under pressure—plans were all set and we worked quickly to get decisions made"; "Decisions became more delegated and less checked by President and other personnel."

The lack of constriction of control we found fails to confirm the threat-rigidity hypothesis. There are some factors, however, that may have worked against finding such an effect. Working as a team is a very strong norm in the school in which the study was performed. The groups in this study seemed to adhere to the norm, making decisions as a group and striving for consensus. In addition, the task allowed for a large degree of specialization, so it was difficult for one person to make all the decisions. Thus, group norms and task demands may moderate the relationship between threat and constriction of control.

An increase in threat clearly leads to increased stress, a result also supported by final subjective reports such as: "We panicked"; "We all hit the roof"; "Only a little shock"; and "Tension increased." However, some group members assured us they "stayed calm."

The overall pattern of results lends support to our initial propositions, at least in regard to information processing and stress. In addition, we were hoping to gain understanding of the influence of our two components of threat. We find the significant influence that level of impact had on the amount of discussion and the amount of information used of particular interest. Such counterintuitive results may represent the best contribution

that the threat-rigidity proposition can make to the study of decision making. A highly important event might be expected to generate greater discussion and use of information in groups such as ours than a routine event. The threat-rigidity approach, however, both predicted and produced the unexpected: relatively less discussion and use of information for the highly important event.

In addition, although it might seem that time pressure would decrease information processing because it decreases the amount of time available, this relationship did not hold across all information processing variables. Despite the reduced time period, there were no significant differences in the amount of information used. Thus, although group members under time pressure do not discuss information as much or interact as much, the amount of information they use is not changed. It may be that under time pressure individuals specialize more and make more decisions alone than they would otherwise, and conversation is cut back to essentials. In a sense, a group under such conditions may find a more efficient means of processing information than it had before.

Both independent factors significantly influenced perceived stress. Stress increased with both level of impact and time pressure, and their interaction was such that stress was greatly exacerbated when subjects experienced events characterized by both high level of time pressure and high level of impact—support for a multiplicative effect for stress. If a high-impact event occurs there is some stress, but a group may know that all will be well in the long run. When time pressure, however, forces a group to deal with that event fast, panic may occur. A more explicit test of the multiplicative effect is needed. It should also be noted that measures drawn from self-reports are the sole basis of our results. We suggest that behavioral measures drawn from third party observation of audio or video tapes be used in the future as convergent evidence.

The post hoc analysis yielded no differences between high and low performing groups on our measures. Staw, Sandelands, and Dutton's broad claim that threat-rigidity occurs regardless of the effectiveness of a group may well be correct. There was certainly no evidence to support the communication network theorists' claim that effective groups had relatively decentralized communication structures.

Although some theorists suggest that widely shared information enhances group performance, it may be that this information sharing serves maintenance, rather than decision-making task functions. We found that some groups believed themselves to have been able, under threat, to get rid of interference, noise, and wasted time and to share only necessary information. These groups found that centralization of communication was more efficient than their previous process. This process-effectiveness relationship should also be studied further.

The lack of significant effects from the analysis over time provides reasonable evidence that our results capture more than just a practice or burn-out effect. Our predictions compete reasonably well with theories of emer-

gent leadership and group development (Bales, 1958; Bales & Strodtbeck, 1951; Heinen & Jacobsen, 1976; Tuckman, 1965). The means over time do not, however, show a smooth progression, which creates difficulty in our separating developmental from time-pressure effects. Future research needs to do explicit tests of this interaction to properly allocate explained variance.

It seems appropriate to comment on the problems and advantages inherent in this simulation. Although the 24 groups were randomly assigned to conditions when possible, members did self-select into particular groups. We do not know what effect this self-selection may have had. Although most of the students found Tycoon to be a worthwhile learning experience and reported being intensely involved with it, the compression of three years of major business decisions into six days gives a kind of surrealistic quality to the game. Even with these drawbacks, the simulation provided several aspects of a realistic environment in which to study business decisions. A complex task, a competitive environment, and a sense of involvement that made the threat real helped to provide external validity, which is often lacking in laboratory research (Hackman 1983). The control over the timing of threatening conditions permitted by a game situation also provided an experimental design without violation of ethical rules. Finally, the use of a simulation allowed for fine-grained analysis of dynamic processes in a situation in which time was compressed and parameters often ignored in field research could be made explicit.

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EFFECTS OF GOAL DIFFICULTY AND EXPECTED EXTERNAL EVALUATION ON INTRINSIC MOTIVATION: A LABORATORY STUDY

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This study examines the effects of goal difficulty and expected external evaluation on individuals' intrinsic motivation. Results show intrinsic motivation to be lowest when individuals cannot attain difficult goals, regardless of whether or not they expect their performance to be evaluated. Individuals exhibited high intrinsic motivation in two conditions: (1) when they attained an easy goal and expected an evaluation and (2) when they attained a difficult goal and expected no evaluation. Implications of these results for future research on intrinsic motivation are discussed.

A number of studies have demonstrated that individuals perform better (1) when assigned difficult goals rather than easy goals¹ and (2) when they expect their performance to be evaluated (Jackson & Zedeck, 1982; White, Mitchell, & Bell, 1977). Other research suggests that goal difficulty and expected external evaluation may have dysfunctional consequences for individuals (Amabile, 1979; Lepper & Greene, 1975; Mossholder, 1980). For example, Mossholder found that individuals' intrinsic motivation to perform an interesting task—as indicated by time spent on the task after the experiment was suspended—was significantly lower when they had a difficult goal than when they had no goal. Amabile found that individuals who expected their task performance to be evaluated exhibited lower intrinsic motivation than subjects who did not expect evaluation.

The research just reviewed suggests that goal difficulty and expected external evaluation have a positive effect on performance but a negative effect on intrinsic motivation. How can these results be explained and reconciled? There are at least two possibilities. First, goal difficulty and expected evaluation may increase extrinsic motivation more than they decrease intrinsic motivation. Thus, individuals are relatively more productive when they face a difficult goal and an evaluation because their total motivation is greater than it would be if they faced an easy goal and no evaluation. A second possibility is that extrinsic motivation produced by difficult goals and expected external evaluations substantially affects task performance,

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¹See Latham and Yukl (1975) and Locke, Shaw, Saari, and Latham (1981) for reviews.

but individuals' intrinsic motivation has implications for entirely different outcomes—for instance, creativity. Previous research that has shown positive associations between measures of intrinsic motivation and individuals' creativity on tasks, risk taking, and work quality (Amabile, 1979; Lepper, Greene, & Nisbett, 1973; White & Owen, 1970) supports this second possibility.

The purpose of the present study is to examine the possibility that goal difficulty and expected external evaluation interact to affect intrinsic motivation, as cognitive evaluation theory suggests (Deci, 1975, 1980; Deci & Ryan, 1980). This theory basically states that (1) a change in perceived locus of causality from internal to external induced by external factors or (2) a perception of incompetence induced by negative feedback will undermine intrinsic motivation. Intrinsic motivation will be enhanced when external factors induce a change in perceived locus of causality from external to internal, or when positive feedback induces a perception of competence.

Several studies provide general support for these propositions.² For example, Deci (1972) and Deci, Cascio, and Krusell (1973) demonstrated that negative feedback diminished intrinsic motivation for both men and women, and positive feedback enhanced men's intrinsic motivation. Other research has suggested that salient or valued rewards and constraints change the locus of causality from internal to external and thereby decrease intrinsic motivation (Enzle & Ross, 1978; Ross, 1975).

In light of these findings, it is possible to predict how goal difficulty and expected external evaluation might interact to affect intrinsic motivation. Previous research has defined a difficult goal as one for which the objective probability of attainment is relatively low (e.g., $p = .14$, Frost & Mahoney, 1976; $p = .20$, Motowidlo, Loehr, & Dunnette, 1978), and an easy goal as one for which the objective probability of attainment is relatively high (e.g., $p = .75$, Motowidlo et al., 1978). Other studies have shown that goal difficulty is negatively associated with individuals' subjective assessment of the probability of its attainment (Matsui, Okada, & Mizuguchi, 1981; Mento, Cartledge, & Locke, 1980). In addition, Matsui and colleagues showed that valence of goal attainment is higher in difficult goal conditions than in easy goal conditions. Given these definitions and results, goal difficulty should have a very substantial effect on intrinsic motivation—particularly when individuals expect their performance to be evaluated.

When goals are difficult and people expect an evaluation, they should exhibit very low intrinsic motivation. Since individuals perceive difficult goals as attractive, desirable targets (Matsui et al., 1981), they are likely to focus their attention and energies on achieving these goals. As a result, individuals may see themselves as engaging in a task for the sake of a goal itself—not for the sake of task activities. In Deci's (1980) terms, individuals facing a difficult goal perceive the locus of causality to be external—and this perception is likely to contribute to low intrinsic motivation. In addition, individuals in this condition are likely to doubt their own competence because

²See Deci and Ryan (1980) for a review.

they are unable to attain a difficult goal. Moreover, they are likely to anticipate additional negative feedback from an evaluator who knows that they have not attained their assigned goal. We expect that such a combination, negative self-administered feedback and expected negative evaluative feedback, will diminish individuals' feelings of competence in this situation, and thereby contribute to low intrinsic motivation.

On the other hand, we expect intrinsic motivation to be very high when individuals face an easy goal and an evaluation. Here, goal attainment is less attractive than with a difficult goal, and in Deci's (1980) terms, the locus of causality is internal. In addition, since they are likely to attain the goal, individuals feel good about their competence and may anticipate additional positive feedback from an external evaluator.

Goal difficulty will have a significant, but far less substantial effect on intrinsic motivation when an individual does not expect external evaluation. As stated previously, individuals assigned an easy goal should exhibit significantly higher intrinsic motivation than those assigned a difficult goal, because the former are more likely (1) to see causality as internal and (2) to generate positive self-administered feedback concerning their competence. However, when individuals do not expect evaluation, no expectation of positive or negative feedback from an external evaluator amplifies the effect of goal difficulty. Thus, the difference in intrinsic motivation between an easy goal/no evaluation condition and a difficult goal/no evaluation condition should be smaller in magnitude than the difference between an easy goal/evaluation condition and a difficult goal/evaluation condition.

METHODS

Subjects

One hundred men undergraduates, having a mean age of 20, and enrolled in an introductory business administration course, participated in the research, for which they earned extra credit. We randomly assigned individuals to the experimental conditions.

Task

Subjects were asked to assemble a specific number of helicopter models resembling a sample model from tinker toys.

A pilot test using a separate group of students enabled us to evaluate how satisfying individuals found the task. Twenty-nine men assembled helicopter models and later completed a brief questionnaire and a personal interview; analysis of the data indicated that they found the task moderately interesting and satisfying.³

³A detailed description of the results of this pilot study is available on request from the authors.

Procedures

Each subject completed a simple tinker toy model, a cannon, to familiarize himself with the materials. We used performance time on this model as an index of ability, as suggested by Locke and colleagues (1981) and by Mento and colleagues (1980).

Each subject then listened to standardized tape-recorded instructions describing the helicopter assembly task and establishing goal difficulty and external evaluation conditions. Parts for 15 helicopter models were available to each man, and each learned that he would have 25 minutes to complete the assigned goal. To provide feedback about goal progress (1) a clock faced participants and (2) completed models remained on a table during the entire experiment. After 25 minutes, the experimenter informed each subject that the experiment was over and that a brief questionnaire would follow. He was also informed that he could do whatever he pleased while the experimenter located a suitable questionnaire: relax, browse through a magazine—several were left in the room in his view—or work with the task. He was also told that any work done during the break would not count toward the goal established in the experimental session. Seven minutes after leaving the room, the experimenter returned, administered the postexperimental questionnaire, and then thoroughly debriefed the subject. Debriefing indicated that subjects accepted and believed the cover story used to justify the free-choice period.

A video camera located behind a one-way mirror monitored subjects' progress throughout the experiment. The experimenter told them that the camera was for observation; debriefing indicated that the camera had no effect on the subjects.

Manipulations

Goal difficulty. We assigned subjects either an easy performance goal (six helicopter models) or a moderately difficult goal (nine models) to achieve during the 25 minute experimental session. After a goal was assigned, each received an index card on which his numerical goal was written and agreed orally to the question: "Would you be willing to try for this goal?"

To establish that the moderately difficult goal was harder than the easy goal, we examined goal attainment figures for the pilot group of 29 subjects. Consistent with expectations, the percentages of pilot subjects attaining their goals in the easy and difficult goal conditions were 87 and 29 percent, respectively. In addition, interviews indicated that they perceived the difficult goal as substantially harder than the easy goal.

Expected external evaluation. We assigned subjects to either an expected evaluation or to a no-evaluation condition. We told those who were to expect evaluation that: "We have been working on this study for the past month and have compiled a great deal of data. Many students have participated in the study and we want to compare your score to theirs. In this way we can see how you do on this assembly task in relation to students who are similar to yourself." In addition, the phrase "Your output will be compared to the output of others" appeared on the index card bearing the assigned goal. No

mention was made of performance comparisons to subjects assigned to the no-evaluation condition.

Measures

Manipulation checks. Questionnaire items administered after the break or free-choice period measured the effectiveness of the goal difficulty and external evaluation manipulations. As a check for goal difficulty, each subject responded to the following two items on a scale that ranged from 1 = strongly disagree to 7 = strongly agree: "The performance goal assigned me was very easy" (reverse scored) and "I found that the assigned performance goal was difficult." We averaged scores for these items to form a goal difficulty index. A statement using the same scale measured expectation of external evaluation: "My performance was measured and compared with the performance of others on this task."

Goal acceptance. Subjects indicated their amount of agreement on 7-point scales, with the following statements: "I was committed to attain the performance goal assigned me" and "I felt a high degree of personal investment in completing the assigned goal." We averaged responses on these items to form a goal acceptance index.

Productivity. The number of pieces used for whole and partial helicopter models made during the experimental period provided an index of productivity. We also computed a second productivity measure, the number of pieces used for whole models only. Since the productivity measures were highly intercorrelated ($r = .97, p < .01$), we decided to use the more comprehensive measure.

Intrinsic motivation. The amount of time participants spent on the task during the free-choice period served as our measure of intrinsic motivation. We viewed session videotapes and recorded the number of seconds they worked with task materials during the free-choice period. To minimize possible Ziegarnik (1927) effects, we did not count time spent on models that had been partially completed during the experimental session⁴ (cf. Mossholder, 1980; Pinder, 1976).

RESULTS

Manipulation Checks

Subjects' responses to the goal difficulty and evaluation questions were analyzed with a 2 (difficult vs. easy goal) \times 2 (expected evaluation vs. no evaluation) analysis of variance. There were no significant two-way interactions, and we report only the significant main effects. The goal difficulty manipulation had a significant effect on the goal difficulty index ($F_{1,96} = 33.25, p < .01$). The mean score on that index for individuals assigned the difficult goal was 3.72; for those assigned the easy goal, 2.05. Furthermore,

⁴Only one individual continued to work on a partially assembled model, expending ten seconds. Combining these data with the free-time measure did not significantly alter results.

during the debriefing session subjects indicated that they found the difficult goal much harder than the easy goal. The expected-evaluation manipulation significantly affected the evaluation index ($F_{1,96} = 44.55, p < .01$). The mean score on the index for individuals who expected evaluation was 4.80; for those expecting no evaluation, it was 3.39. Thus, the data provide convincing evidence that the manipulations were effective, and because there were no significant interactions or confounding main effects, we feel confident that the manipulations had independent effects on the subjects.

Results of a two-way ANOVA, used to determine if goal acceptance differed by condition, indicated that neither experimental manipulation had a significant effect on the goal acceptance index. A mean acceptance score across all experimental conditions of 4.83, coupled with the oral agreement each subject gave, suggests that they accepted assigned goals under all four experimental conditions.

Performance

In an effort to replicate the results of previous studies of goal setting and expected evaluation, we ran a two-way ANOVA with task performance as the dependent variable. Table 1 presents the results of these analyses, and Table 2 reports intercell means. Our results, which were consistent with previous goal-setting research (e.g., Latham & Baldes, 1975; Locke, 1982; London & Oldham, 1976), indicated that goal difficulty had a significant effect on the number of models constructed. Inspection of the means in Table 2 reveals that subjects assigned a difficult goal performed at higher levels than those assigned an easy goal.

To determine if differences in subjects' abilities caused these results, we ran a 2×2 analysis of covariance (ANCOVA) with the same experimental treatments and the ability measure—time required to complete the simple model cannon—as the covariate. The results were basically identical to those

TABLE 1
Summary of Analyses of Variance
for Task Performance and Intrinsic Motivation

Variable	Source	df	MS	F	ω^2
Task performance	Goal difficulty	1	56311.3	19.11**	.15
	Expected evaluation	1	2332.9	0.79	.00
	Interaction	1	3422.3	1.16	.00
	Error	96	2947.2		
Intrinsic motivation	Goal difficulty	1	113030.4	4.32*	.03
	Expected evaluation	1	25728.2	0.98	.00
	Interaction	1	143035.2	5.47*	.04
	Error	96	26169.9		

* $p < .05$

** $p < .01$

TABLE 2
Summary of Experimental Cell Differences
for Task Performance and Intrinsic Motivation

	Task Performance			Intrinsic Motivation		
	Easy Goal	Difficult Goal	Mean	Easy Goal	Difficult Goal	Mean
No evaluation	289.4	325.2	307.3	159.1	167.5	163.3
Evaluation	287.4	346.6	316.9	266.8	123.9	195.4
Mean	288.4	335.9		212.9	145.7	

just reported, suggesting that the significant effects of goal difficulty on performance cannot be attributed to differences in subjects' abilities.

Unlike those of previous research (e.g., White et al., 1977), our results indicated that expected external evaluation had no effect on subjects' performance. Moreover, we found no significant expected evaluation \times goal difficulty interaction.

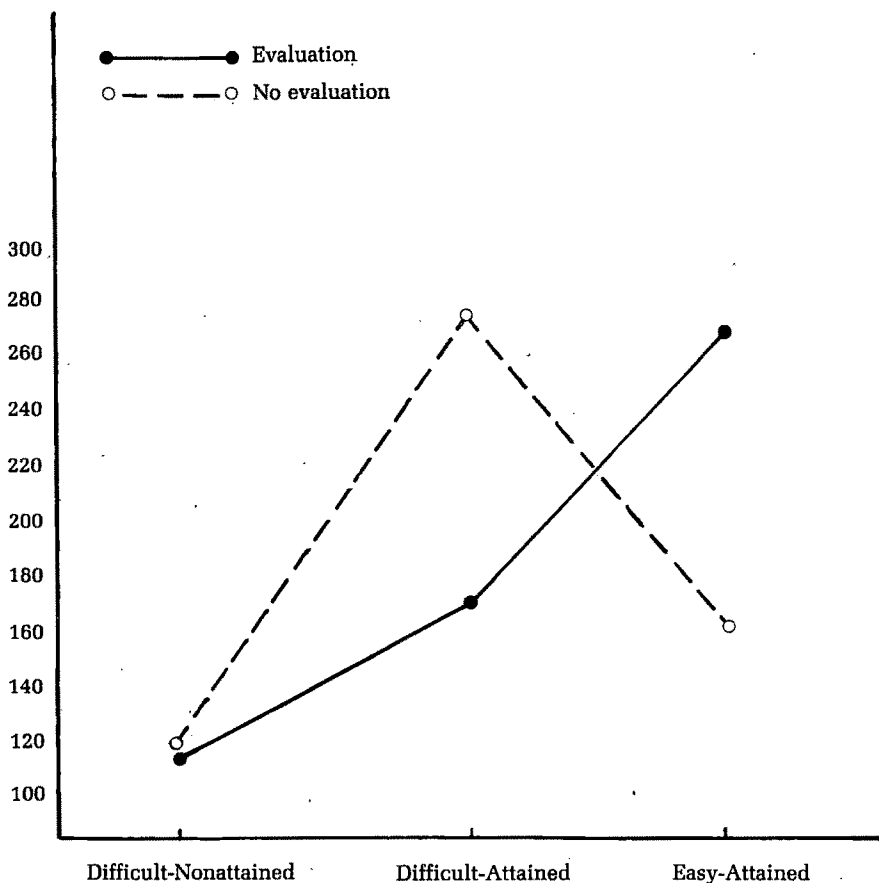
Intrinsic Motivation

As Table 1 shows, the results of a two-way ANOVA with intrinsic motivation as the dependent variable, performed as a test for the predicted interaction of goal difficulty and expected evaluation, reveal a significant main effect for goal difficulty, qualified by a significant interaction between this variable and expected evaluation. Comparisons among the means presented in Table 2 indicated that, in the no-evaluation condition, there were no significant differences in intrinsic motivation between individuals assigned easy goals and those assigned difficult goals ($t_{48} = .17$, n.s.). On the other hand, consistent with predictions, individuals who faced an easy goal and an evaluation exhibited significantly higher levels of intrinsic motivation than those who faced a difficult goal and an evaluation ($t_{48} = 3.33$, $p < .005$, 2-tailed test). Moreover, intrinsic motivation scores for participants assigned an easy goal and an evaluation were significantly higher than for those assigned a difficult goal and no evaluation ($t_{48} = 2.15$, $p < .05$, 2-tailed test), or for those assigned an easy goal and no evaluation ($t_{48} = 2.39$, $p < .05$, 2-tailed test).

One of the reasons difficult goals lead to lower intrinsic motivation than easy goals is that the former are attained less frequently than the latter. To examine the effect of attainment on intrinsic motivation, we conducted analyses comparing subjects who attained their goals with those who did not. All fifty of the men assigned easy goals attained them; 20 percent ($n = 5$) of those assigned a difficult goal and an evaluation attained their goal; and 32 percent ($n = 8$) assigned the difficult goal and no evaluation attained theirs. We constructed three goal difficulty-attainment groups—difficult-nonattained, difficult-attained, and easy-attained—and crossed these with the two evaluation conditions in a 2×3 ANOVA. Results revealed a significant main

effect for goal difficulty-attainment ($F_{2,94} = 5.09, p < .01$) and a marginally significant interaction between this variable and expected evaluation ($F_{2,94} = 2.77, p < .07$). This interaction, displayed graphically in Figure 1, shows that individuals exhibit the highest levels of intrinsic motivation when they attain an easy goal and expect an external evaluation ($\bar{x} = 266.8$), or when they attain a difficult goal and expect no evaluation ($\bar{x} = 272.0$). On the other hand, individuals who do not attain difficult goals exhibit the lowest levels of intrinsic motivation—regardless of whether or not they expect evaluation. A comparison of mean intrinsic motivation scores using *t*-tests revealed that individuals in the difficult-nonattain group exhibited significantly lower motivation than those in the difficult-attain group who expected no evaluation and those in easy-attain group who did expect evaluation ($p < .05$, two-tailed test). Finally, individuals in the difficult-attain group who expected

FIGURE 1
Intrinsic Motivation as a Function of Goal
Difficulty-Attainment and External Evaluation



evaluation exhibited lower intrinsic motivation than individuals in the easy-attain group who expected evaluation and those in the difficult-attain group who expected no evaluation; however, these differences were not statistically significant ($p > .10$, two tailed test).

A further analysis focused only on subjects who attained their goals. We crossed the easy-attain and difficult-attain groups with the two evaluation conditions in a 2×2 ANOVA. Results revealed a significant interaction ($F_{1,59} = 4.17$, $p < .05$). Once again, these results suggest that individuals exhibit high intrinsic motivation when (1) they attain easy goals and expect an evaluation and (2) when they attain difficult goals and expect no evaluation. In the other attainment conditions, intrinsic motivation was relatively low.

To supplement these findings, we conducted two additional analyses. Calder and Staw (1975a) suggested that differences in free time spent on a task could be due to differences in individuals' performance during the experimental period. That is, high performers may choose to spend little free time on a task because of fatigue rather than loss of intrinsic motivation. A second possibility is that intrinsic motivation results were caused by differences in subjects' abilities. To test these possibilities, we ran 2×2 and 2×3 ANCOVAs on intrinsic motivation scores with performance and abilities as separate covariates. Results of these analyses were basically identical to those reported earlier in this paper; they suggest that differences in ability or level of performance do not explain the effects of expected evaluation and goal difficulty obtained in this study.

Finally, it must be noted that results involving the attain and nonattain groups require cautious interpretation. Since the difficult-nonattain and difficult-attain groups were not random, it is possible that some unknown factor caused differences in intrinsic motivation. Second, since cell sizes were slightly disproportional in these analyses, results involving interactions may be misleading.

DISCUSSION

Results of this study suggest that goal difficulty and expectation of external evaluation interact to affect intrinsic motivation. Individuals who cannot attain difficult goals show very low levels of intrinsic motivation, regardless of whether or not they expect their performance to be evaluated. Apparently, negative self-administered feedback concerning competence is enough to reduce intrinsic motivation—expecting a negative evaluation from an external source has little effect once an individual has failed to attain the goal. On the other hand, expecting an external evaluation substantially affects individuals who attain either difficult goals or easy goals. Individuals exhibit high intrinsic motivation when they attain difficult goals and anticipate no external evaluation. However, intrinsic motivation is substantially lower among individuals who attain a difficult goal and expect external evaluation. These results suggest that attaining a difficult goal is intrinsically rewarding and

that any added form of external evaluation may actually reduce the intrinsic motivation that goal attainment produced.

A different picture emerges when we look at attainment of an easy goal. Here, intrinsic motivation is highest when individuals expect an external evaluation. No expectation of evaluation significantly decreases intrinsic motivation. Apparently, attaining an easy goal does not engender positive, self-administered feedback. Individuals' competence and intrinsic motivation are enhanced only when attainment of an easy goal combines with expectation of positive external feedback.

The results described above differ substantially from those obtained in a recent study by Garland (1983). He found that goal difficulty had no effect on intrinsic motivation, despite the fact that only 17 percent of individuals studied attained the difficult goal. There are several possible explanations for these conflicting findings. One possibility involves differences in measures of intrinsic motivation used in the studies. Garland's measure was the number of optional experimental trials on which participants agreed to work after they completed the required trials; the current study, by contrast, used a behavioral measure of intrinsic motivation. Another possibility is that the individuals assigned an easy goal in the Garland study did not anticipate an external evaluation of their performance. More research is now needed to investigate possible explanations for these conflicting findings.

Consistent with results of earlier research (e.g., Latham & Baldes, 1975; Locke, 1982), results of this study showed that individuals assigned difficult goals perform significantly better than those assigned easy goals—yet, most of the subjects assigned difficult goals also exhibited relatively low levels of intrinsic motivation. These results bring into question the underlying sources of motivation that account for the comparatively higher levels of performance in the difficult goal conditions. As suggested in the introduction, one possible explanation for these results is that external constraints, such as difficult goals, substantially increase extrinsic motivation and slightly decrease intrinsic motivation. Thus, the total motivation, both extrinsic and intrinsic, that persons assigned difficult goals have is substantially greater than what those assigned easy goals have, and this difference in total motivation accounts for the performance results. Research is now needed to examine systematically the extent to which difficult goals enhance individuals' extrinsic motivation.

The results obtained in this study may not generalize to other populations and conditions. For example, we included only undergraduate men in this study. Given the findings of previous research (e.g., Deci, 1972; Deci, Betley, Kahle, Abrams, & Porac, 1981), it is quite possible that women would react differently than men to expected evaluation and goal difficulty. This possibility warrants research attention in the future.

More work is also needed to examine the effect of the nature of experimental tasks on individuals' reactions to goal difficulty and expected evaluation. Previous research (e.g., Arnold, 1976; Mossholder, 1980) has shown that the effects of external conditions—money and goals, for instance—on intrinsic motivation may vary with task interest; therefore, the effects of

goal difficulty and expected evaluation on intrinsic motivation may also differ among types of tasks.

The present study adds to the literature on the effects of external factors, such as pay, competition, time deadlines, and feedback, on intrinsic motivation (cf. Amabile, DeJong, & Lepper, 1976; Calder & Staw, 1975b; Deci, 1972; Deci et al., 1981; Salancik, 1975). More work is now needed to understand the way these various factors interact to influence individuals' intrinsic motivation. For example, might individuals who face an easy goal and an evaluation and also receive spoken rewards exhibit higher intrinsic motivation than individuals in other conditions? And might individuals who face a difficult goal and who receive incentive pay exhibit lower intrinsic motivation than others? Such questions about the ways external factors combine and interact to influence intrinsic motivation deserve research attention in the future.

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AN INVESTIGATION OF THE RATER-RATEE ACQUAINTANCE AND RATER BIAS

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This study examines correlates of rater-ratee acquaintance. Results indicated that differences in sales productivity could account for overall rating and promotion differences associated with both personal and task acquaintance between raters and ratees. However, the effects of rater-ratee acquaintance may depend on rating format. Turnover and personal acquaintance were related.

Considerable research has been devoted to improving the psychometric characteristics of performance ratings. Until recently, performance appraisal researchers have concentrated on improving rating scales (Bernardin & Beatty, 1984; Carroll & Schneier, 1982; Latham & Wexley, 1981), producing slight, albeit important, gains in rating accuracy (Landy & Farr, 1980). It has become increasingly clear that efforts to improve the psychometric properties of ratings that focus on rating instruments are somewhat misguided, since the psychometric properties of a scale derive from many factors. Further gains in rating accuracy will require a better understanding of a larger number of appraisal-relevant parameters like raters' cognitive processes (DeNisi, Cafferty, & Menlino, 1983; Feldman, 1981), the social climate of the organization (Bernardin, Orban, & Carlyle, 1983; Kane & Lawler, 1979), and the purposes for which the rating is used (Zedeck & Cascio, 1982).

One important yet largely neglected parameter that merits investigation is the amount and type of work contact raters have with ratees which we will henceforth call *task acquaintance*. Although increased task acquaintance might be expected to improve rating quality—through reducing halo error caused by an insufficient knowledge of ratees' behavior (Cooper, 1981)—the empirical evidence indicates that there is neither a strong nor a consistent relationship between task acquaintance and rating quality. Studies have found increased validity (e.g., Bare, 1954; Kornhauser, 1926), increased reliability (e.g., Ferguson, 1949), and less halo error (e.g., Brown, 1968; Koltuv, 1962) as task acquaintance increased, but other studies have reported no improvement in rating quality (e.g., Hollander, 1956a, 1956b, 1957; Moore, 1937). In fact, some studies have revealed relatively poor quality ratings to be associated with increased task acquaintance. Knight (1923) reported problems of

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leniency and halo error among raters who had worked a long time with ratees—and thus presumably had more knowledge about their work behavior than did other raters. Similarly, Ferguson (1949) found that insurance managers gave more favorable ratings to long-term sales associates than to short-term ones.

One explanation for these inconsistent results lies in the crude nature of the measures of task acquaintance used. In the past, researchers have measured task acquaintance in terms of raters' length of acquaintance with ratees (e.g., Knight, 1923); frequency of contact between raters and ratees (e.g., Freeberg, 1969); and self-reports of raters' overall familiarity with ratees' work performance (e.g., Ferguson, 1949). Such indirect measures are inadequate because it may be the relevance of contacts between raters and ratees that largely determines rating quality (Freeberg, 1969; Landy & Farr, 1980).

Another explanation for conflicting findings concerning effects of rater-ratee acquaintance is that previous conceptualizations have probably been overly simplistic. An underlying assumption of previous research has been that rating quality should increase with rater-ratee acquaintance, because raters then have adequately representative samples of behavior on which to base assessments of ratee performance. But perhaps the hypothesized positive relationship between task acquaintance and rating quality is limited to early stages of rater-ratee relationships, when raters are relatively unacquainted with ratees and their job behaviors. In these early stages, frequent work interaction provides raters with information upon which impressions of ratees on a variety of dimensions are formed. Where the sample of ratees' behavior is incomplete, additional information increases the accuracy of inferences made about ratee performance and enables raters to classify ratees into appropriate category prototypes (Tversky, 1977). Although the accuracy of rater judgments should increase to the extent that continued interaction provides raters with additional relevant performance information, it is questionable whether increased task acquaintance increases rating accuracy once the role relationship between rater and ratee has formed, because human beings have shortcomings in acquiring and processing information.

As mentioned earlier, existing category prototypes that raters possess influence their initial assessments of ratees. Though a rater may have used the wrong prototype category to infer characteristics about a ratee, such perceptions persist because the rater has considerable confidence that inferences about ratee characteristics are valid (Nisbett & Ross, 1980). In addition, impressions of ratees' performance may become fairly stable and resist change even if their performance has changed objectively (Cantor & Mischel, 1977, 1979). That is, there may come a point at which raters are no longer capable of perceiving relevant information, or of using it to change their impressions of ratees (Ross, 1977). This may occur either (1) because raters, after categorizing the performance of ratees, see little need to collect more information—they feel they already know a ratee's performance effectiveness—or (2) because raters may process new information on a highly selective basis. DeNisi and colleagues (1983) suggested that raters' prior assessments of ratees not only

determine the amount and type of information sought, but also cause the raters to distort any disconfirming information or to consider it an aberration that is to be ignored. Consequently, there is a tendency for raters to attribute evidence of effective performance on the part of favorably assessed ratees to 'the ratees' own efforts, so that their high evaluations are further entrenched, and to attribute ineffective performance to situational factors (Ross, 1977). Ratees previously judged to be poor performers, however, may continue to receive low evaluations despite overwhelming evidence of improvements in performance because raters attribute the improvements to unstable and uncontrollable causes like luck, rather than crediting individuals.

In summary, it is not clear that increased task acquaintance improves the accuracy of raters' judgments. On the one hand, increased task acquaintance may provide raters with additional information that results in a refinement of the classification scheme used or a recategorization of ratees. On the other hand, once raters have formed impressions of ratees, they may recall these general impressions rather than apply judgments based upon objective observations of work behavior, and they may selectively use new information to confirm and further stabilize previously formed impressions. Thus, although we could certainly expect more valid ratings from raters thoroughly familiar with ratee performance than from raters who are unacquainted or only casually acquainted with relevant aspects of that performance, we do not know whether significant differences in rating quality should be expected where the difference in degree of task acquaintance among raters is not so extreme.

Another conceptual deficiency in previous rater-ratee task acquaintance research is that researchers have failed to consider personal relationships between raters and ratees. Yet, as task acquaintance between the two increases, a rater becomes more familiar with a ratee's personal habits, interests, and values—a familiarity we will call *personal acquaintance*—and develops some degree of positive or negative affect toward the ratee. Such positive affect could facilitate rating accuracy by encouraging ratees to be more open with raters, thereby providing raters with much information, favorable and unfavorable, on which to base judgments (Beer, 1981). In addition, raters may give more accurate ratings to friends than to others because they are more willing to candidly evaluate friends.

On the other hand, there are legitimate reasons to believe that a rater's affect toward a ratee may lead to an unintentional or intentional inflation of ratings. Shunned insiders tell vivid stories about how friendship, not performance, determines success in organizations (e.g., Wright, 1979). A rater's primary concern in conducting a performance appraisal may be preserving friendship with a ratee or repaying personal favors rather than producing accurate ratings—especially when evaluations are a basis for allocations of organizational rewards. Even if favoritism is not blatant, a rater's affect toward a ratee may still unintentionally bias the best and most conscientious judgments. Recent evidence indicates that when strong feelings are involved, raters may be especially prone to making the biasing errors discussed earlier



in this paper—clinging to inaccurate and outdated beliefs, making erroneous attributions and selective observations, etc.—because raters who like or dislike a ratee have great difficulty in accurately observing and rationally processing information about that individual's performance (e.g., Bernardin & Beatty, 1984; Mitchell & Kalb, 1981; Zajonc, 1980). Failure to consider personal acquaintance between raters and ratees, therefore, may partially explain the inconsistent results of previous rater-ratee acquaintance research.

The purpose of the present study was to investigate both task and personal acquaintance as they relate to rating favorability and halo error. In particular, we sought to examine the rating characteristics exhibited by raters who differ as to their degree of task and personal acquaintance with ratees, but who are all generally acquainted with ratees' job performance.

Since evidence of differences in the favorability of ratings may reflect either rater bias or actual differences in ratee performance, we used a relevant objective criterion as an external standard for estimating whether favorability differences represent true differences or rater bias. Finally, we also examined differences in promotion and turnover rates among subordinates having different levels of acquaintance with their supervisors to determine whether rater-ratee acquaintance results in inequitable distribution of rewards and loss of valued employees.

METHODS

Organizational Setting and Sample

Questionnaires were mailed to 150 male, first-level sales supervisors from 78 branch offices as part of a attitudinal survey of randomly selected employees in the sales division of a large, international manufacturer of data processing equipment. Eighty of these sales supervisors returned questionnaires for a response rate of 53 percent. Additional analyses revealed no apparent problems of sample bias; a comparison of respondents with nonrespondents produced no significant differences in age, sales productivity, experience, or rated effectiveness.

Each supervisor responded to survey items concerning four subordinates. Supervisors' mean span of control was 5.1 subordinates, but to control for potential effects of gender and to ensure the availability of an objective criterion measure, we only used data pertaining to men with at least one year of sales experience; most supervisors (75%) thus provided data only for their subordinates who met these criteria. Data was thus actually available for 175 subordinates.

Rater-Ratee Acquaintance Measures

Task acquaintance. Self-reports of supervisors' familiarity with specific behavioral dimensions of a sales representative's job provided measures of supervisor acquaintance with the aspects of subordinate work performance relevant to performance appraisal. We derived the seven behavioral dimen-

sions selected for the task acquaintance scale from the behaviorally anchored rating scales (BARS), described in the next section, that had been developed as part of a validation conducted in the organization. For each behavioral dimension, we asked immediate supervisors to choose the statement that best reflected their familiarity with that aspect of a subordinate's work performance. The four descriptive anchors used were:

1 = unacquainted - I'm relatively unfamiliar with this aspect of the individual's job behavior.

2 = casual & indirect familiarity - Although I am somewhat familiar with this aspect of his/her behavior, much of my knowledge is indirect (e.g., by reputation).

3 = general familiarity - I am generally familiar with this aspect of the individual's work behavior. My knowledge is based upon both direct interactions and on some indirect, but relevant, information.

4 = extreme familiarity - I am thoroughly familiar with this aspect of the individual's work since he/she has exhibited this skill in my presence on numerous occasions. I feel that I know how he/she behaves or would behave when this job skill is required.

Summing scores across the seven acquaintance items gave us a task acquaintance score; these scores ranged from 15 to 28. Inter-item correlations were fairly high ($\alpha = .81$).

Other data indicated that most of the supervisors were fairly familiar with the work of subordinates, because supervisors worked out of the same office as subordinates and held formal weekly meetings with them. Moreover, the mean length of acquaintance between supervisors and subordinates was 3.5 years.

Personal acquaintance. Personal acquaintance between supervisors and subordinates was measured with selected items from the Self Disclosure Questionnaire (SDQ) developed by Jourard and Laskow (1958). The SDQ, a widely used instrument in interpersonal perception research, reflects the degree of intimacy of relationships on a personal level. Low scores represent mere acquaintance, and high scores reflect close friendship.

First-level sales managers were asked to indicate the extent to which they had talked about specific topics with a subordinate during their acquaintance. The topic areas chosen pertained to subordinate work problems, pressures, satisfaction, and personality. Examples of the SDQ items include "the kinds of things that just make me furious," "what I feel are my special strong points and qualifications for my work," "things in the past or present that embarrassed me," and "what I find to be the worst pressures and strains in my work." The supervisors responded to SDQ items on a 3-point scale ranging from 1 = has told me nothing about this aspect of them to 3 = have talked in full and complete detail about this topic. We obtained composite personal acquaintance scores that ranged from 20 to 54 by summing across the 18 SDQ items ($\alpha = .92$).

Criterion Variables

Rating scales. Following the procedures outlined by Smith and Kendall (1963), we developed behaviorally anchored rating scales (BARS) as part of a validation study and used them in this study. There were seven BARS dimensions: interpersonal skills, knowledge of products, planning and organization, taking direction, knowledge of applications, working with people within the company, and followup. We also obtained supervisor ratings of overall performance. We recorded ratings on the BARS dimensions on 9-point scales ranging from ineffective to effective, and used a 5-point scale for the overall performance dimension.

Objective criterion measure. For an objective measure of job performance we used the subordinate's percentage of dollar sales quota attained during a ten-month period, the primary basis of evaluation the organization used in making administrative decisions, for example, concerning promotions.

Rating characteristics and data analyses. The rating level a subordinate received on each rating dimension measured rating favorability. The standard deviation of the ratings across dimensions computed for each ratee was our index of halo error (Kingstrom & Bass, 1981). We then computed correlations between task and personal acquaintance and the halo and favorability indices.

Analyses of rating favorability were performed for each BARS dimension and for the overall evaluation separately; we also examined the relationship between acquaintance and a BARS composite score formed by computing the mean rating the subordinate received across BARS dimensions. Initial results indicated that sales productivity was correlated with rater-ratee task acquaintance, personal acquaintance, and rating favorability. In order to explore whether relatively high ratings received by subordinates with whom supervisors had higher degrees of task and personal acquaintance than they had with others represented true differences in performance or favorability bias, we conducted hierarchical regression analyses.

Turnover and promotion. Turnover and promotion data among sales subordinates were obtained for the two-year period following the initial survey; we examined two years because all subordinates included in the sample would have possessed the necessary experience to be considered for promotion to sales management by the end of that period. Abstracted from personnel records, this information was available for 109 of the 175 subordinates.

RESULTS

Rating Characteristics

Table 1 presents means, standard deviations, and intercorrelations for rating favorability, halo error, sales productivity, and the rater-ratee acquaintance measures. The results revealed no significant relationship between raters' task and personal acquaintance with ratees and halo error. Differences in rating favorability were evident, however. Rating favorability was signifi-

TABLE 1
Means, Standard Deviations, and Intercorrelations for Rating Favorability, Halo Error, Sales Productivity, and Acquaintance Measures

Variables	Mean	s.d.	Work Acquaintance	Personal Acquaintance	Sales Productivity
Interpersonal skills	6.30	1.40	.17*	.23**	.14*
Product knowledge	6.58	1.62	.03	.27**	.20**
Planning and organization	6.08	1.74	.14*	.21**	.18**
Taking direction	6.17	1.81	.19**	.29**	.19**
Applications knowledge	6.67	1.67	.11	.21**	.07
Working with coworkers	6.72	1.64	.09	.18**	.20**
Followup	6.16	1.71	.19**	.25**	.15*
BARS composite	6.38	1.24	.18**	.31**	.22*
Overall performance	3.57	0.80	.17*	.24**	.30**
Halo error	1.40	0.35	.09	.03	-.11
Work acquaintance	24.50	3.56	1.00	.38**	.22**
Personal acquaintance	37.89	8.00	.38	1.00	.14*

* $p = .05$

** $p = .01$

cantly related to increased task acquaintance on the overall evaluation ($r = .17$) and on four of the seven BARS dimensions ($r = .14-.17$), and the relationship approached significance on two others. Personal acquaintance between rater and ratee was associated with rating favorability on all BARS dimensions ($r = .18-.29$) and on the overall evaluation ($r = .24$). Thus, ratees with whom raters reported relatively high task or personal acquaintance generally received significantly more favorable ratings than did others.

Although ratees with whom raters had higher task and personal acquaintance received more favorable evaluations, rating favorability differences may represent true differences in ratee performance, rater bias, or some combination of the two (Gordon, 1972). Consequently, we conducted hierarchical regression analyses to determine whether the rating favorability differences among subordinates could be explained and thus justified by differences in subordinate productivity. We performed three regressions for each BARS dimension and the overall evaluation. The variables included in the prediction equations were: (1) sales productivity; (2) sales productivity, task acquaintance, and personal acquaintance; (3) sales productivity, task acquaintance, personal acquaintance, and the task \times personal acquaintance interaction. The results appear in Table 2. Test for significant differences in multiple Rs indicated that the task and personal acquaintance between rater and ratee significantly increased rating favorability on five of the seven BARS dimensions. In addition, adding the rater-ratee acquaintance measures into the regression equation also significantly increased the multiple R^2 for a BARS composite measure constructed by taking the mean rating

TABLE 2
Results of Hierarchical Regression Analyses of Rating Favorability
on Objective Performance, Rater-Ratee Acquaintance, and Their Interaction^a

Dependent Variables	1 ^b	2 ^c	Significant Increment R ² ? ^e	3 ^d	Significant Increment R ² ? ^e
Interpersonal skills	.14	.27	yes	.32	yes
Product knowledge	.20	.32	yes	.33	no
Planning and organization	.18	.24	no	.28	no
Taking direction	.19	.32	yes	.34	no
Applications knowledge	.07	.20	yes	.24	no
Working with coworkers	.20	.24	no	.27	no
Followup	.15	.29	yes	.29	no
BARS composite	.22	.35	yes	.37	no
Overall performance	.30	.34	no	.35	no

^aN = 175.

^b1 = sales productivity.

^c2 = sales productivity, task acquaintance, personal acquaintance.

^d3 = sales productivity, task acquaintance, personal acquaintance, and task × personal acquaintance interaction.

^eF tests are for significant increments in R². R²s were corrected for shrinkage using the formula: Adjusted R² = 1 - [1 - R² (n-1)/(n-k-1)], where n is the number of subjects and k is the number of independent variables.

across the BARS dimension. In contrast, results showed little evidence of an interaction effect because, with the exception of the interpersonal skills BARS dimension, predictions of rating favorability on the overall evaluation were not significantly increased by adding rater-ratee acquaintance to the regression equation.

In summary, while the results revealed that subordinates with high task or personal acquaintance with supervisors received more favorable evaluations, these same subordinates also exhibited higher levels of sales productivity than their counterparts. Whereas rating favorability on the overall performance dimension was no longer associated with rater-ratee acquaintance after we took differences in sales productivity into account, favorability differences still remained on the BARS dimensions.

Promotion and Turnover Rates

The data revealed turnover and promotion rates of 34 percent and 37 percent, respectively. Table 3 shows correlations between the rater-ratee acquaintance measures, sales productivity, and promotion and turnover. Table 3 shows that subordinates having higher sales productivity ($r = .30$) or higher task ($r = .22$) and personal ($r = .17$) acquaintance with supervisors than other employees were more likely to be promoted to sales management. At the same time, employees who were less productive ($r = .20$) or who had lower personal acquaintance with supervisors ($r = -.26$) than others were more likely to leave the organization. The relationship between rater-ratee task acquaintance and turnover was not significant, however.

Multiple regression analyses were performed for the promotion and turnover variables to determine whether rater-ratee acquaintance resulted in significant increments in predictive accuracy over and above subordinates' objective sales productivity. The results, summarized in Table 4, indicated that rater-ratee acquaintance did not contribute significantly to predicting promotion, but that subordinates with relatively high personal acquaintance with supervisors were more likely to remain with the organization.

Finally, when objective sales productivity was entered into the regression equation first, there was no significant increase in predictive accuracy of either rating favorability or promotions after rater-ratee acquaintance measures were added.

DISCUSSION

This study raises several interesting questions concerning the effects of rater-ratee acquaintance. Our results indicated that subordinates with whom supervisors had established relatively high task and personal acquaintance received significantly more favorable overall performance ratings and were

TABLE 3
Correlations Between Rater-Ratee Acquaintance
Measures, Sales Productivity, Promotion, and Turnover

Variable	Promotion	Turnover	Work Acquaintance	Personal Acquaintance	Sales Productivity
Promotion ^a	1.00	-.35	.22	.17*	.30**
Turnover ^b	—	1.00	-.09	-.26**	.20*

^aCoded 1 = no, 2 = yes.

^bCoded 1 = quit, 2 = stay.

* $p < .05$

** $p < .01$

TABLE 4
Results of Multiple Regression Analyses
of Promotion and Turnover on Sales Productivity and Increments
in Predictive Accuracy from Adding Acquaintance Measures ^a

Variable	1 ^b	2 ^c	Significant Increment? ^e	3 ^d	Significant Increment? ^e
Promotion	.30	.32	no	.33	no
Turnover	.17	.17	no	.30	yes

^aN = 109.

^b1 = sales productivity.

^c2 = sales productivity, task acquaintance.

^d3 = sales productivity, task acquaintance, personal acquaintance.

^eF tests are for significant increments in R^2 . R^2 s were corrected for shrinkage using the formula: Adjusted $R^2 = 1 - [1 - R^2 (n-1)/(n-k-1)]$, where n is the number of subjects and k is the number of independent variables.

more likely to be promoted than other subordinates. At the same time, subordinates with relatively high work or personal acquaintance with their supervisor also exhibited significantly higher sales productivity than did others. Therefore, differences in rating favorability on the overall performance evaluation and promotion differences appear to be at least partially attributable to true differences among subordinates rather than to rater bias.

In contrast, subordinate sales productivity could not completely account for rating favorability differences associated with rater-ratee acquaintance on the BARS dimensions. Although this suggests that favorability bias associated with rater-ratee acquaintance is evident on the BARS ratings, the findings are perhaps attributable to the rating task confronting raters. BARS and other behavior-based formats ask evaluators to observe and assess subordinate behavior rather than outcomes of behavior. Sales productivity, although a relevant criterion for evaluating sales effectiveness and overall performance, is not so relevant for assessing bias in rater judgments of subordinate behavior. Employee behavior and productivity levels are undoubtedly related, but opportunity biases, economic conditions, and other factors not under an individual's control also affect sales productivity. This indirect relationship between behavior and performance may explain the inability of the sales criterion to account for rating favorability differences on the BARS dimensions in the regression analyses.

Our use of a BARS format might also explain why significant favorability differences appeared on the behavioral dimensions but not on the overall performance rating, after we had controlled for productivity differences associated with the rater-ratee acquaintance. Although previous BARS research has revealed little differential favorability bias among formats, existing studies are inconclusive (Kingstrom & Bass, 1981). Moreover, reduced leniency error is a commonly cited advantage of proposed format alternatives to BARS such as mixed standard scales (Blanz & Ghiselli, 1972). Additional research in this area is obviously needed.

The turnover results yielded particularly interesting findings. Differences in turnover rates were evident among subordinates with relatively low personal acquaintance with supervisors, even after we controlled for potential differences in mobility opportunities due to differences in sales productivity. A likely reason for the differential turnover rates was, perhaps, differences in subordinate expectations. Although analyses gave little evidence of favoritism shown towards subordinates with whom supervisors had high personal acquaintance, subordinates with low personal acquaintance with supervisors may have believed that preference had been or would be given to coworkers with whom supervisors had relatively close relationships. In addition to examining the effects on rating characteristics, therefore, future studies should investigate the effect of rater-ratee acquaintance on the perceived equity and acceptability of performance appraisal systems.

Limitations of the present study also need to be recognized. We do not know to what extent the results can be generalized, since the study was conducted in a single organization among employees having the same job. In

fact, the unique availability of an objective criterion in itself potentially limits the generalizability of our findings. Moreover, the sample consisted of raters and ratees who typically had relatively long-term, established relationships in a situation in which subordinates' jobs were relatively autonomous. Whether similar conclusions would arise in other settings where rater and ratee have been acquainted for a relatively short time, or where role relationships are different, merits investigation.¹

Future research may also gain increased understanding of the effects of rater-ratee acquaintance by examining it at different stages of development. Investigating such acquaintances in their early stages, in particular, might reveal the bases upon which relationships are formed and differentiated, and any corresponding effects on rating quality. For example, the extent to which work interactions are required due to interdependencies should be studied. Where work activities are highly interdependent, high task acquaintance may reflect little more than the formal role relationship between rater and ratee. On the other hand, where work activities can be carried out relatively independently and therefore interactions are largely optional, high task acquaintance reflects something more than formal role relationship. In the latter situation, we would hypothesize rater-ratee acquaintance to be positively associated with rating favorability, as previous research indicates that supervisors are more supportive of and more willing to work with high performing subordinates than low performers (Farris & Lim, 1969). At the same time, such research could assess the extent to which supervisors differentiate among subordinates on the basis of considerations that are not job-related or ill-founded impressions formed early in their acquaintance.

Finally, future studies should examine the effects of rater-ratee acquaintance in the context of the history of relationships between raters and ratees. Most performance appraisal systems ask raters to make formal evaluations of ratee effectiveness for a specific time period—one year, for instance—in effect asking raters to separate their observations and judgments during a specific time period from all previous ones. However, ratees' behavior and accomplishments during the appraisal period may be no more important than their past behavior and accomplishments because, at some point, raters have selectively processed or distorted information about ratees' work performance to fit their existing opinions. Whether these perceptual processes color rater judgments, despite use of generally recommended performance appraisal procedures—like diary-keeping—to reduce recall and memory biases, also merits investigation. Research in this area will allow us not only to determine how much knowledge raters must have to validly assess ratee performance, but, in addition, to learn whether there comes a point when raters' critical

¹Available research suggests that peer evaluations, for instance, may be less affected by the rater's sentiments for the ratee than supervisory evaluations (e.g., Amir, Kovarsky, & Sharan, 1970; Love, 1981; Waters & Waters, 1970). The reasons are not totally clear, but it may be because peers have "less to lose" because evaluations are more anonymous and because biasing effects of different personal sentiments are counterbalanced because peer evaluations are typically averaged among raters.

ability or willingness to provide accurate assessments of job performance diminishes.

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RESEARCH NOTES

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THE DETERMINANTS OF FUNDS RAISED BY CORPORATE POLITICAL ACTION COMMITTEES: AN EMPIRICAL EXAMINATION

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Organizational theorists and other management scholars have long recognized that business corporations operate in complex environments that significantly affect their performance. In recent years, with the federal government an increasingly salient contributor to the complexity of many firms' task environments, the management literature has begun to focus on the effects of this development (Alpin & Hegarty, 1980; Miles, 1982; Post, Murray, Dickie, & Mahon, 1983). Corporations have responded to growing federal intervention in several ways. Many have instituted or expanded formal multipurpose public affairs units to monitor and influence the political environment (Baysinger, 1984; Baysinger & Woodman, 1982; Post et al., 1983). One corporate response has aroused much public controversy—the burgeoning of corporate political action committees (PACs) through which firms channel money into the campaign coffers of candidates for federal offices. The PAC phenomenon has led to several useful studies in management and other disciplines (e.g., Epstein, 1980; Kau, Keenan, & Rubin, 1982). However, scholars have given scant theoretical or empirical treatment to the determinants of variations in corporations' abilities to raise PAC funds.¹ The purpose of this paper is to test hypotheses concerning such variations within a theoretical framework. To our knowledge, the present study is the first comprehensive attempt to analyze this question. A tentative explanation of potential variations in corporate political power at the national level is implicit in its findings.

THEORETICAL FRAMEWORK, HYPOTHESES, AND METHODS

Corporations engage in a variety of political activities, including lobbying, constituency building, and setting up public affairs units and PACs. PAC activity differs from these others in that it is a direct attempt to buy access to

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¹For exploratory treatments of the determinants of organizational political activities, see Ottensmeyer (1983), Pittman (1977), and Thoma (1983).

lawmakers, or influence them, through influencing elections. In the past, public concern about the potential buying power of corporations has led to governmental attempts to restrict the involvement of business in campaign financing (Epstein, 1980). The Federal Election Campaign Act of 1971, amended in 1974 and 1976, forbade corporations to contribute their general treasury funds directly to federal candidates (U.S. Federal Election Commission, 1982a: 3-5). However, they may establish so-called segregated funds, or PACs. A corporation may contribute up to \$5,000 in PAC money, which must be raised through voluntary contributions to a candidate. A corporation may legally create many PACs, but all of its PACs together may not give more than \$5,000 to one candidate. The act generally restricts corporations to soliciting their stockholders and administrative and executive employees for PAC contributions, but they may solicit other employees twice a year. Previous research (Mulkern, Handler, & Godtfredsen, 1981) has shown that corporations raise most of their PAC money from administrative and executive personnel.

As noted earlier in this paper, corporate PAC activity has burgeoned. In 1974, 89 corporate PACs contributed \$2.5 million to federal candidates, but in 1982, 1,310 such PACs contributed over \$27 million. In fact, corporate PAC contributions surpassed labor donations by a considerable amount in 1980 (Masters & Delaney, 1984). Within the context of this overall growth, there is considerable variation among corporations in how much their PACs raise and how much they contribute to candidates.

This study tested hypotheses on the determinants of variation in corporations' abilities to raise PAC funds. The corporations analyzed were listed in *Fortune's* 1980 1,000 industrial and 300 nonindustrial listings (Fortune, 1980a, 1980b, 1980c). Data were these firms' PAC receipts in the 1979-80 election cycle. We focused our attention on these *Fortune* firms rather than on other firms with PACs because the former raised the vast majority (73.4%) of total corporate PAC receipts for those years. In addition, data on the determinant variables are more comprehensive for these firms. Only *Fortune* firms with PAC receipts figured in the study because our objective was to explain variations among firms that had already decided to raise such funds. Finally, we selected 1979-80 for two reasons. First, when this study ended, only interim data for 1981-82 were available. Second, our principal concern was differences in electoral activity among firms, rather than over time.

Framework and Hypotheses

The theoretical basis of this study was the idea that two broad types of factors, the organization-specific and the environmental, explain differences in corporations' abilities to raise PAC funds. We expected organization-specific factors to have direct effects on such abilities and expected environmental factors to have indirect effects through creating differing incentives for PAC fundraising. More precisely, our framework was: PAC receipts = f (organizational personnel, size, and corporate PAC experience; governmental dependence and regulation; and economic environment). Several organiza-

tion-specific factors are likely to affect firms' abilities to raise PAC money, particularly in light of federal election laws governing such fundraising. For instance, firms with large numbers of employees may be in relatively better positions to raise PAC money because they have larger bases from which they may solicit PAC funds than other firms do. The specific determinants of PAC fundraising abilities involve corporations' sizes and wealth as well as their past histories in raising PAC dollars. To control for these factors in the model, we made a firm's assets, profits, numbers of employees, and PAC histories independent variables.

However, the central hypotheses of this study concerned the potential indirect effects of environmental factors on firms' PAC fundraising abilities. Statements of hypotheses and their background follow.

Hypothesis 1: The amount the federal government purchases from firms' product markets is positively related to those firms' PAC receipts.

Dependence on revenues from the federal government was expected to provide practical justification for raising PAC money. Firms that greatly depend on government purchases may feel strong incentives to raise PAC money so as to promote their political influence. They may thus be better able, compared to other firms, to persuade their employees to contribute to their PACs, and they thereby increase their fundraising abilities. The federal government is a significant purchaser of private sector goods and services, particularly for defense. We thus predicted that the more firms depend on government purchases, the greater their incentives and abilities to raise PAC funds will be.² Unfortunately, we lacked a direct measure of amounts of firms' revenues from the federal government. As a proxy, we used an index that measures the percentages of industries' goods and services the federal government buys. We thus could capture the relative dependencies of corporations in different industries on government purchases.

Hypothesis 2: The extent to which a firm's task environments are affected by federal government regulation is positively related to its PAC receipts.

The federal government has adopted two major types of regulations that seek to affect a firm's conduct. The so-called horizontal regulations govern various managerial activities across industries; occupational safety and health and equal employment opportunity laws are examples. The second type, vertical regulations, typically govern economic competition within industries. Since direct measures of the effects of these types of regulations on firms are unavailable, we approximated degrees of exposure to governmental regulation. Our proxy was a five-category industrial classification variable, designed to pick up the effects of varying degrees of economic regulation on firms' incentives and abilities to raise PAC funds. The industrial classifications were (1) metals, manufacturing, and mining; (2) construction and housing; (3) food, leisure, and service; (4) finance; and (5) transportation, energy, and communications. We expected firms in the fifth category to have the largest PAC

²Ritz (1979) contains data on government purchases.

receipts, reflecting the relatively large degree to which that sector has historically been subjected to economic regulation.³ This industry variable was, however, an imperfect measure of governmental regulation; it may have picked up effects that were endemic to the industries rather than caused by regulation. Nonetheless, it appeared to be the best proxy available; other studies have used it for similar purposes (e.g. Pittman, 1977).

Hypothesis 3: Firms with relatively large assets operating in relatively noncompetitive product markets are more likely to raise large amounts of PAC money.

Certain industry market structures and asset levels were expected to both create incentives for firms to raise PAC funds and to positively affect their fundraising abilities. We expected a combination of (1) relatively concentrated industry market and (2) large assets to have an interactive effect on a firm's PAC receipts. Olson provided an economic argument in support of this idea. He theorized that there is little incentive for firms in economically competitive markets to engage in political action because (1) they lack surplus resources and (2) the "collective" nature of the benefits that such activity may yield is likely to encourage free-riding. Benefits from favorable public policies may accrue equally to firms, regardless of how much they invested in political action. Conversely, firms in relatively concentrated industries are more likely than other firms to have surplus resources for politics, and they are likely to gain proportionately more from their political action as their economic assets rise (1965: 133-145).

There are, however, qualifications to Olson's thesis. Some benefits from public policies are not purely collective, and thus there may be a relationship between firms' levels of political investment and their deriving such benefits, regardless of the competitiveness of their industries. Also, firms in competitive industries are not identical; some may therefore stand to gain more than others from certain public policies. Such differences would be incentives for differing levels of political investment. Nonetheless, we posit Hypothesis 3, realizing there are limits to its validity.

To capture the combined effect of concentration and assets on PAC receipts, we computed an interaction term, firm assets \times concentration. By itself, the assets variable was a continuous, firm-specific measure. Concentration was a dummy variable. If the four-firm market concentration ratio of a firm's industry was greater than or equal to 50 percent, concentration equaled 1; otherwise it equaled 0. The U.S. Department of Commerce (1981) defines concentration in terms of what percentage of the total value of an industry's shipments its four largest companies make.⁴ We would have preferred to

³Several previous studies (Epstein, 1980; Long & Link, 1983; Pittman, 1977) have pointed out that the transportation, communications, and energy sector has long operated under federal regulations relating to industry competition and pricing. The Interstate Commerce Commission, the Federal Communications Commission, the Civil Aeronautics Board, and various federal energy agencies have essentially been the administrative apparatus for this regulation.

⁴The "percentages consist of the sum of the value of the shipments of the largest 4 companies . . . divided by the total value of shipments of the industry" (U.S. Department of Commerce, 1981: 9, 61).

have used a continuous concentration measure rather than a dummy variable, but the Department of Commerce only calculates such a measure for manufacturing industries. Our sample included many nonmanufacturing industries, such as banking and airlines, for which there are no precise concentration measures. Therefore, we approximated the concentration ratios of these industries by comparing the assets and sales of the largest nonmanufacturing firms listed by *Fortune* to the total assets and sales of all *Fortune* firms listed in the largest firms' corresponding nonmanufacturing industries. From these comparisons, we estimated whether an industry's four-firm concentration ratio was greater or less than 50 percent. Because our method of calculating concentration is based on a limited sample and is much cruder than the one used by the Department of Commerce for manufacturing industries, we felt uncomfortable in using a continuous measure of concentration for nonmanufacturing industries. We therefore used the dummy variable for the entire sample.

Hypothesis 4: Rates of unionization within firms' industries are expected to have a positive effect on the amounts of PAC funds firms raise.

Union power has been associated with rates of unionization (e.g., Feuille, Hendricks, & Kahn, 1981).⁵ Union control over the personnel practices of firms is arguably greater the more highly organized the industries the firms belong to are. Thus, firms in relatively highly unionized sectors may have greater incentive to influence the national labor-relations legal framework than other firms. Administrators and supervisors in these firms may therefore be highly motivated to contribute to PAC funds. Moreover, unions are often actual or potential competitors with corporations in the political arena (Epstein, 1969). There may then be a relationship between rates of unionization in industries and how much competition from union interest groups corporations in those industries face; this, too, may encourage corporate political action.

Statistical Methods and Model

A two-stage multiple regression analysis was used to examine the effects of industry environments upon the amounts of PAC funds corporations raised. The first stage involved regressing firms' PAC receipts for 1979-80 upon the following firm-specific measures: PAC history, a dummy variable with 1 assigned to firms with PACs active in the 1977-78 and 1979-80 election cycles, 0 otherwise; profits, profits in 1979; assets, assets in 1979; and employees, total number of employees in 1979.

Industry environmental variables were added in the second stage of analysis: concentration ratio, a dummy variable with 1 assigned to firms in an industry with a four-firm concentration ratio greater than 50 percent, 0 otherwise; unionization, the percent of unionization in firms' industries; government purchases, an index of the amounts of goods, measured in

⁵Freeman and Medoff (1979) contains data for rates of unionization in industries.

percentages, purchased by the federal government from the outputs of firms' industries; manufacturing, metals, mining, a dummy variable for the metals, manufacturing and mining industries; construction and housing, a dummy variable for the construction and housing industries; food, leisure, service, a dummy variable for the food, leisure, and service industries; finance, a dummy variable for the financial industries; and assets \times concentration, an assets-concentration interaction term.

A significant increase in R^2 was expected in the second stage, as were positive coefficients for government purchases, assets \times concentration, and unionization; we expected negative coefficients for all the industry dummy variables. (Transportation, energy, and communications was the omitted industry group.)

Data and Sample

As noted earlier in this paper, the unit of observation was PAC receipts collected in the 1979-80 election period by firms that appeared in the *Fortune* 1,000 industrial and 300 nonindustrial listings for 1980. A U.S. Federal Election Commission (1982b) report on corporate and labor PAC finances was the source of PAC receipt data; data on the independent variables came from a variety of sources.⁶ *Forbes* (1980) provided data on corporate assets, profits, and numbers of employees. Corporations were grouped into industrial classifications on the basis of the 40-category *Business Week* (1980) industry classification. The index of financial dependence on government came from the *Survey of Current Business* (Ritz, 1979). Freeman and Medoff's study (1979) estimating private-sector unionism was the source of data on unionization. Market concentration information for manufacturing industries came from the 1977 *Census of Manufacturers* (U.S. Department of Commerce, 1981). A 1980 FEC report on corporate PAC finances for 1977-78 election activity provided PAC histories (U.S. Federal Election Commission, 1980).

RESULTS

Table 1 gives results of the two-stage multiple regression analysis.⁷ The four organization-specific variables entered in the first step—assets, profits, employees, and PAC history—collectively explained 35 percent of the variation in corporate PAC receipts. The environmental variables entered in the second step collectively increased the explained variation to 38 percent; also the increment in the R^2 was significant in the second step ($F = 2.64$; $df = 8,437$; $p < .05$).⁸ It may be argued that these variables together increase firms' abilities to raise PAC money, perhaps by providing practical reasons to justify PAC activity to those corporate employees who are asked to contribute.

⁶The authors will provide a detailed description of data sources on request.

⁷The authors will provide a table of intercorrelations between variables on request.

⁸See Kerlinger and Pedhazur (1973) for the conventional F -test used.

TABLE 1
Regression Results with 1979-1980 Corporate PAC Receipts
as Dependent Variable

Explanatory Variables	Unstandardized Coefficients	Standardized Coefficients	Unstandardized Coefficients	Standardized Coefficients
Constant	17935.80***	—	29999.32***	—
Employees	46.49***	.47	44.63***	.45
PAC history	16779.62**	.10	16075.59**	.10
Assets	0.001**	.10	0.001**	.12
Profits	0.01	.08	0.008	.06
Concentration ratio	—	—	-27740.45	.04
Unionization	—	—	8275.92	.02
Government purchases	—	—	1085.81**	.11
Manufacturing, metals, mining	—	—	-21706.47**	-.13
Food, leisure, service	—	—	-22494.23**	-.11
Finance	—	—	-24774.58*	-.11
Construction and housing	—	—	-7490.55	-.01
Assets × concentration	—	—	0.01	.04
N	450			450
F	60.31			22.50
R ²	.35			.38

* $p < .10$, two-tailed test

** $p < .05$, two-tailed test

*** $p < .01$, two-tailed test

Perhaps more revealing, however, were the specific results of the second step. Their confirmation of two of our central hypotheses suggests that government is an explanatory factor. Federal government purchases of industry goods and services were significantly and positively related to levels of firm PAC receipts, as the coefficient for government purchases shows. Additionally, the results on the five-category industry variables suggest that governmental regulation is also positively related to PAC receipts. In other words, the relatively strong historical regulation of industry competition and pricing in the transportation, energy, and communications sector has apparently contributed to a high level of corporate PAC activity. Each of the industry coefficients is in the predicted direction, and coefficients are statistically significant for manufacturing, metals, and mining; food, leisure, and service; and finance.

However, results did not support the third hypothesis; the concentration-assets interaction was not statistically significant, for perhaps two reasons. First, had we been able to use a continuous measure of market structure, we might have obtained a different result. The dichotomous variable may mask genuine relationships between market structure and PAC activity. Second, and more substantively, some large firms in concentrated industries may perceive the visibility of extensive PAC activity as disadvantageous (Pfeffer & Salancik, 1978; Salamon & Siegfried, 1977). Such visibility may intensify the widely held public perception that there is "too much power in the hands of a few big companies" (Dowling & Schaefer, 1982: 688). Thus, these firms may devote proportionately more resources to other kinds of political action that are less publicly visible, like lobbying. Results also failed to support the fourth hypothesis. The unionization coefficient was of the predicted sign, but insignificant. This may have been because the measure was industry-wide rather than firm-specific; data of the latter type do not exist. The coefficient's insignificance may also have been due to unionization being a relatively weak measure of competition between interest groups. On the other hand, the results may indicate that there is more union-management cooperation on the political front than we had anticipated. Herndon (1982) has shown that corporations are pragmatic in their PAC activity, supporting both Democrats and Republicans. Hence, the ideological conflict between unions and management in politics may be somewhat exaggerated by previous research (Epstein, 1969).

DISCUSSION

This study tested four hypotheses on the determinants of corporations' abilities to raise PAC funds. The results of a two-step regression model revealed that environmental variables together contributed significantly to the explanatory power of the model. Additionally, two of our hypotheses received support, and the overall model appeared reasonably well specified, explaining 38 percent of the variation in corporate PAC receipts; firm-specific measures accounted for 35 percent, however. There is obviously room for significant improvement—better measures of some of the variables would

have been desirable. For example, different measures of union power or interest-group competition might have yielded more robust results. Furthermore, other more idiosyncratic variables, such as the political beliefs of corporate officers involved in PAC activity and the degree of authority and power these officers have, might have bolstered the overall robustness of the model. However, such variables might be very difficult to measure.

Two major implications flow from this analysis. First, government, through its actions as a purchaser and regulator, appears to significantly affect how corporations behave as political interest groups. Clearly, firms in industries highly affected by government attempt to influence policy-making through financing election campaigns. More broadly, firms having this relatively dependent status operate as if the benefits associated with raising PAC money outweigh the costs. They see PAC activity as a useful—or at least necessary—way of attaining or defending organizational objectives. It is interesting to note that although the “business of business is business,” governmental involvement in the political economy apparently contributes substantially to business’ departure from strictly business affairs. This is not to question the legitimacy of corporate political action, but merely to suggest that corporate PAC activity is tied somewhat to the extent to which the federal government itself supports and regulates business. When corporations in turn support politicians through PAC money, a symbiotic business-government relationship occurs.

The second implication of this analysis stems from the diversity in corporate PAC activity. Obviously, there is significant variation in the level of electoral effort firms undertake. It is arguable that corporations’ political influence varies with the extent to which their PACs effectively influence the outcomes of elections and policy decisions. For instance, because of their large PAC fundraising, we might expect firms in the transportation, energy, and communications sector to be relatively powerful in politics.

These implications raise several questions that merit further investigation. First, what benefits do corporations in fact derive from PAC activity? Conversely, what costs do they incur? Second, what is the precise relationship between governmental regulation and individual corporations’ PAC activity? Do different kinds of regulation have different effects on corporate PAC activity? Third, to what extent is there variation in corporations’ political influence that is attributable to observed differences in their PAC activity? Finally, it would be useful to investigate whether the results of this analysis apply to other kinds of political action, such as lobbying and constituency building by corporations. Along this line, it is interesting to speculate that governmental regulation may encourage many different kinds of political action. A previous study (Masters & Keim, 1984) found that firms in the highly regulated utilities industry (transportation, energy, and communications) had very active public affairs units. Thus, there is evidence suggesting that firms in some industries may view different political tools as complementary. We strongly encourage research into these issues and others relevant to corporate political action.

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THE COMPOSITION OF BOARDS OF DIRECTORS AND INCIDENCE OF GOLDEN PARACHUTES

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Golden parachutes are a new and controversial management perquisite that allow covered managers to voluntarily resign and collect substantial

remuneration—in some cases several million dollars—after a triggering event, usually a hostile takeover. This ability to unilaterally pull a ripcord has provoked much criticism of this perquisite.

Critics of golden parachutes see them as evidence that senior managers can be more interested in maximizing their own incomes than in shareholder returns. *Business Week*, for example, in an editorial entitled “The Gilded Ripoff,” stated that the ethical difference between golden parachutes and theft is “hard to discern” (1982:136). On the other hand, proponents of golden parachutes justify them as a means of attracting and keeping new managerial talent as well ensuring that current management remains objective, loyal, and on board during a hostile takeover attempt.¹

What characteristics are firms that give managers contracts with golden parachutes likely to have? One possible factor is the composition of a firm’s board of directors, since it is the board that must ultimately approve such arrangements. Perhaps directors who are insiders are likely to be less independent of the CEO and senior management than are directors who are outsiders. Bacon and Brown reported general agreement among board members of major U.S. corporations that “the board should have a majority of outside directors. . . . [to] properly carry out its responsibilities and maintain its necessary independence of management” (1977:91). This suggests that if managers want golden parachutes they are more likely to get them in firms that have a high percentage of directors who are insiders. Thus we expect:

Hypothesis 1: The probability that firms will give their management golden parachute contracts is positively related to the percentage of directors who are insiders.

Another factor likely to be related to whether or not firms provide golden parachutes is the amount of stock that members of boards of directors own. Directors who own substantial amounts of stock should be more inclined to put the interests of stockholders above those of management. To the extent that golden parachutes are unwarranted diversions of stockholder monies, they should be more common in firms with boards that own relatively little of the firms’ stock than in firms with boards that own much stock. Thus:

Hypothesis 2: The probability that firms will grant golden parachute contracts is negatively related to the percentage of total stock outstanding that their boards of directors own.

The size of firms is likely to be related to their propensity to issue golden parachutes. Large firms, at least until 1984, were not considered likely takeover targets, so their managements had less incentive to acquire this particular perquisite than did small firms’ managers. In addition, small firms may feel more need to offer such an exotic perquisite than do large firms. Thus:

Hypothesis 3: The probability that firms will grant golden parachute contracts is negatively related to their size.

¹See, for example, the Superior Oil (1982) proxy statement, p. 15.

Firms that are underperforming and therefore not achieving full potential profits are more likely to be takeover targets than are firms with healthy profits. Further, underperformers are more likely than strong firms to find it difficult to attract and retain qualified managers. Thus:

Hypothesis 4: The probability that firms will grant golden parachute contracts is negatively related to their financial performance.

Finally, since debt is unattractive to a potential raider, firms that are highly leveraged are less likely takeover targets than those that are not. In fact, adding financial leverage is a defensive tactic often used to avoid takeovers (Brealey & Myers, 1981: 674). Thus we expect:

Hypothesis 5: The probability that firms will grant golden parachute contracts is negatively related to their debt.

DATA AND METHODS

In order to test the stated hypotheses, the 1982 proxy statements of the Fortune 500 firms were examined and the following variables derived for each firm. For each director of the 406 firms for which relevant information was available, we determined employment status and number of shares owned. From this data, we derived three measures of the status of board members. *INSIDER1* is the number of directors who were current employees of a firm divided by the total number of directors. *INSIDER2* is the number of directors who were current or former employees divided by the total number of directors. *INSIDER3* is the number of directors whose status was one of the following—current employee, ex-employee, employee of a customer or a supplier, employee of a firm's investment bank or corporate counsel, employee of its parent company or a subsidiary—divided by the total number of directors. *INSIDER1* corresponds to the technical or narrow definition of inside directors, and *INSIDER3* counts all affiliated directors as insiders.

The percentage of stock owned by a board was measured in terms of shares owned by directors divided by total shares outstanding. To measure firm size we used (1) book value of total assets, and (2) rank within the Fortune 500, based upon sales volume, or *FORTUNE*.

Four measures of financial performance were initially employed: (1) Operating income divided by total assets, or *ROA*, measures use of assets. A major strength of this measure is that it is free from the effects of bias that can result from differences in capital structure between firms. However, the effect of inflation on the book value of assets can distort it. (2) Net income divided by common equity, or *ROE*, measures effects of firm actions on stockholder funds more directly than the first financial measure does. Though it is also free of bias effects caused by differences in leverage, it suffers from distortion of depreciation due to inflation. (3) Operating income divided by sales measures management's ability to generate profits from sales. This performance measure is largely free from inflation bias. (4) The excess value ratio, or *EXCESS*, a relatively new measure of financial performance, mea-

asures the difference between the total market value of a firm (market value of equity and book value of debt) and the book value of its assets normalized by sales—that is, the value premiums or discounts the market accords to each firm. A major advantage of this measure is that it reflects market evaluation of firms. Since firms whose market value is below their book value are more likely takeover targets than firms in the opposite situation, this measure may be more closely related to the incidence of golden parachutes than the other financial performance measures.²

Financial leverage was measured by interest-bearing debt divided by total assets. Our initial analysis employed three measures of insider status, two of firm size, and four of financial performance in order to assure that results would be independent of the idiosyncrasies of any particular measure. Results that are largely unaffected by the particular insider, size, and financial performance measures employed should inspire more confidence than results that are so affected.

Proxy statements for the firms in the sample were examined for evidence of granting golden parachutes, narrowly defined as a guarantee of severance pay after a triggering event related to a change in control, even in cases of voluntary termination. We found 52 of the 406 firms for which adequate data were available to have such agreements with their executives. Existence of a golden parachute agreement, or *GOLDENP*, was a categorical variable set to 1.0 if firms had no such agreement and 2.0 if they did.

Initial data analysis consisted of calculating Spearman correlations for all combinations of variables. Because the financial performance, insider status, and size measures would incur multicollinearity problems if an analysis contained more than one of each group at the same time, we tested each possible combination separately. After this initial screening, we employed logit analysis (Doyle, 1977).

RESULTS

Initial analysis of the Spearman correlation matrix (Table 1) revealed some interesting, and in certain cases, surprising, results. Contrary to expectations, the incidence of golden parachute agreements was negatively correlated with the percentage of a board who were insiders. In fact, there was a significant negative correlation for all three insider measures.

The correlation between the existence of golden parachute agreements and ownership was both weak and insignificant. Therefore, it appears that the percentage of total stock outstanding that boards own is not significantly related to firms granting golden parachutes. Likewise, the correlation between leverage and incidence of golden parachutes was weak and insignificant. Thus we eliminated these two variables from further analyses.

However, the financial performance measures were all negatively correlated with incidence of golden parachutes. This is consistent with Hypothe-

²For a more complete discussion of excess value, see Errunza and Senbet (1981).

sis 4, that firms that are relatively weak financially are more likely to issue golden parachutes than are stronger firms.

The correlations between existence of a golden parachute agreement and the size measures, book value of total assets and rank in the *Fortune* 500 in terms of sales volume, showed similar results. However, the correlation between this sales volume measure and existence of a golden parachute agreement was somewhat stronger than that between the latter and the asset measure. Relatively small firms, as expected, appear more likely to give management golden parachutes.

Thus, the most significant explanatory variables were (1) percentage of insiders on a board, (2) financial performance, and (3) size. Further examination of the correlation matrix showed little evidence of multicollinearity of the financial performance measures with the *Fortune* 500 sales volume rank. Though some of the correlations between the insider measures and both the excess value ratio and rank in the *Fortune* 500 were statistically significant, the correlations themselves were weak and so multicollinearity was not a problem with these relationships either.

After eliminating financial leverage and director stock ownership because of insignificant correlations, and focusing on *Fortune* 500 sales volume rank as the measure of size, we tested the following logit model for all three insider status measures and for all three financial performance measures:

$$\text{GOLDENP} = a_1 + a_2 \text{INSIDER} + a_3 \text{FORTUNE} + a_4 \text{FIN} + \epsilon,$$

where $\text{INSIDER} = \text{INSIDER1}, \text{INSIDER2}, \text{or } \text{INSIDER3},$

and $\text{FIN} = \text{ROA}, \text{ROE}, \text{or } \text{EXCESS}.$

Though ROA and ROE showed results similar to those for the excess value ratio in the correlation analysis, *EXCESS* proved to be the only significant financial performance variable in the logit regression, confirming our belief that the excess value ratio would be more closely related to incidence of golden parachutes than would the other measures of financial performance.

Table 2 shows the results of the logit regression. These results did not confirm Hypothesis 1, which stated that the probability that firms will give their management golden parachute contracts is positively related to the percentage of the boards of directors who are insiders. In fact, the opposite statement—that the probability that firms will give their management golden parachute contracts is negatively related to the percentage of the boards of directors who are insiders—is significant for all three insider measures.

However, results did confirm Hypothesis 3, that firm size is negatively related to the probability that firms will grant golden parachute contracts. Likewise, Hypothesis 4, that firms that are underperforming financially will be more likely than others to provide golden parachute contracts, was also confirmed.

TABLE 1
Spearman Correlation Coefficients

	1	2	3	4	5	6	7	8	9	10	11
1. Existence of golden parachute agreement ^a											
2. Current employee-directors ^b	-.11*										
3. Current & past employee-directors ^b	-.13**	.93***									
4. Current, past, & affiliate employee-directors ^b	-.14**	.71***	.73***								
5. Interest-bearing debt/total assets	.02	-.06	-.08	-.03							
6. Director-owned shares/total shares	-.05	.23***	.24***	.16**	.06						
7. Operating income/sales	-.07	.11*	.12*	.16**	-.20***	-.06					
8. Net income/common equity (ROE)	-.14**	.11*	.12*	.07	-.31***	.10	.50***				
9. Operating income/total assets (ROA)	-.13**	.18***	.19***	.15**	-.44***	.11*	.69***	.70***			
10. Excess value ratio ^d	-.14**	.20***	.22***	.14**	-.34***	.19***	.52***	.64***	.73***		
11. Total assets	-.06	-.15**	-.10	.01	.02	-.56***	.21***	.00	-.09	-.15**	
12. Rank in Fortune 500 ^f	-.10*	-.14**	-.07	-.00	-.06	-.51***	.07	.09	-.02	-.07	.94***

^aDummy variable, with 1 = no such agreement, 2 = agreement exists.

^bDivided by total number of directors.

^cAffiliates = firm's customer, supplier, investment bank, counsel, parent, or subsidiary.

^dFirm's total market value less book value of assets.

^eIn terms of sales volume.

^fSign reversed so that two size measures would be consistent.

*p < .05

**p < .01

***p < .001

TABLE 2
Logit Analysis Results

Variable	Coefficient Estimate	Chi-Square Statistic	R ²
Intercept	-2.100	18.04***	.112
Current employee-directors/total number of directors	-2.665	4.79*	
Rank in <i>Fortune</i> 500 ^{a,b}	0.003	7.04**	
Excess value ratio ^c	-1.718	5.79*	
Intercept	-1.980	14.48***	.114
Current or past employee-directors/total number of directors	-2.752	5.18*	
Rank in <i>Fortune</i> 500 ^{a,b}	0.003	6.43*	
Excess Value ratio ^a	-1.657	5.39*	
Intercept	-1.799	10.89***	.092
Current, past, and affiliates ^d employee-directors/total number of directors	-2.472	6.24*	
Rank in <i>Fortune</i> 500 ^{a,b}	0.003	5.65*	
Excess value ratio ^c	-1.700	5.77*	

^aIn terms of sales volume.

^bSign is reversed.

^cFirm's total market value less book value of assets.

^dAffiliates = firm's customer, supplier, investment bank, counsel, parent, or subsidiary.

*p < .05

**p < .01

***p < .001

DISCUSSION

The principal, and surprising, result of this study was that firms with comparatively higher percentages of directors who are insiders are less likely to give management golden parachute contracts. These suggestive results raise doubts about the theory that insider-dominated boards allow managers to consume higher levels of perquisites than do boards having other compositions. The effect of board composition on other perquisites and compensations should be investigated. If such investigations showed that the results of the present study could be generalized, then scholars and practitioners would have to question pressure to increase percentages of outside directors on corporate boards.

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PUBLIC AND PRIVATE SECTOR DIFFERENCES: CEOS' PERCEPTIONS OF THEIR ROLE ENVIRONMENTS

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Comparative studies of private and public sector organizations often consider organizations with dissimilar tasks or business purposes: profit-making business firms commonly represent the private sector, and nonprofit service or government regulatory agencies commonly represent the public sector. However, these studies generally have not accounted for this difference in business purpose, and have attributed the differences that have frequently been observed to organizations' affiliations with the presumably different sectors (e.g., Blumenthal, 1979; Buchanan, 1975; Buyot, 1962; Rainey, 1983; Rainey, Backoff, & Levine, 1976; Wamsley & Zald, 1976). The argument for this all too common use of the distinction between public and private sectors as the basis of a framework for interpreting observed differences is that the legitimizing goals and basic orientations of the two sectors vary, and so determine different institutional milieux for organizations affiliated with each. Hence, investigators expect differences between the two sectors in organization-environment relations and in managerial practices.

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The purpose of this study is to examine whether or not these commonly expected private-public differences emerge from a comparison of environmental perceptions of chief executive officers (CEOs) of organizations having similar task environments—that is, public and private industrial organizations. If, when similar organizations are compared, the expected differences in perceived environments appear, the case for sector differences would be considerably strengthened. But, if such a comparison fails to support the expected differences, it will suggest that perceived differences in organization-environment relations are probably due to differences in task or functional environments, rather than to sector affiliation.

PUBLIC AND PRIVATE SECTOR DIFFERENCES

Research has commonly assumed that the goals legitimizing and governing public and private ownership of organizations differ. Profits and self-interest are the overall legitimizing goals of private firms, whereas the legitimizing goal of public ownership is social amelioration that would not be achieved under private ownership (e.g. Blau & Scott, 1962; Rainey et al., 1976; Wamsley & Zald, 1976). Investigators assume that these essentially different goal orientations determine different institutional milieux, and hence different organization-environment relations, internal structures, and management processes. Of the wide range of differences reported in the literature, three aspects of executives' role environments are of interest here: (1) environmental influences on CEOs' decision-making autonomy; (2) extent of external control to which CEOs are subjected; and (3) their satisfaction with the rewards their role environment provides.

Researchers have suggested various differences in environmental influences on public and private organizations. Rainey and colleagues (1976) and Wamsley and Zald (1976) wrote that public organizations have lower market exposure and different legal and formal constraints than private ones. Blumenthal (1979), Walsh (1978), and Zaleznik (1979) noted different exposure to political influences and stronger relations with political or government authorities for public organizations. Arrow and Lind (1970) mentioned different attitudes towards risk, and Vernon (1981) specified relative immunity from bankruptcy. Mintzberg (1973) and Nigro and Nigro (1977) claimed that high level managers in government organizations have a more political role than managers in the private sector because they need to seek appropriations through political processes, or to cope with political influences and external political coalitions. Researchers have also suggested that the discretionary authority of public and private executives varies in extent. Rainey and colleagues (1976) indicated that managers in public organizations have less flexibility than managers in private organizations. Blumenthal (1979), Bower (1977), and Nigro and Nigro (1977) pointed to higher exposure to public scrutiny. Self (1977) spoke of higher accountability because of the statutory, procedural, and other external controls to which managers of public organizations are subjected (e.g., Buchanan, 1974; Weiss, 1974).

Affective reactions such as role attitudes and job satisfaction differ between the two sectors as well. Public sector managers report lower organizational commitment, lower satisfaction of work needs, and lower job satisfaction than do private sector managers (Buchanan, 1974; Rainey, 1983; Rhinehart, Barrek, DeWolfe, Griffin, & Spaner, 1969).

Thus, differences are hypothesized between public and private sector managers for at least the three aspects of role environment examined in the preceding paragraphs: (1) perceptions of the influences that environmental elements exert on their autonomy; (2) discretionary authority—in terms of the time span of discretion; and (3) satisfaction with job rewards.

As suggested earlier, most studies of differences between the public and private sectors have not accounted for varying orientations of the organizations studied. Public sector organizations have been represented mostly by not-for-profit government agencies that had either a social service or a regulatory orientation; the private ones were for-profit and market-oriented “business firms,” “manufacturing concerns,” or “private enterprises” (e.g., Buchanan, 1975; Guyot, 1962; Rainey, 1983; Rhinehart et al., 1969; Weiss, 1974). Consequently, it is possible that differences that have been found between public and privately-owned organizations were not results of differences in ownership, but rather, results of differences in the functional or task environments of the organizations selected to represent each sector. If differences were indeed due to organizations’ task or functional environments, the use of the public-private distinction as an interpretational framework should be reexamined. The purpose of this study is, therefore, to examine the conjecture that task environment accounts for differences that have been found by comparing perceptions of role environments for public and private CEOs in similar industrial organizations.

METHODS

The study is a secondary analysis of part of a larger data set on organizational and managerial variables for Israeli CEOs of industrial organizations. Organizations represented a wide range of industries, from food and textiles (each constituting 20% of the sample), through metals (7%), to chemical processing, and electric and electronic products (2–5 firms each). Organizational size ranged from 100 to 26,000 employees, with 245 the median and 160 the mode. Only a few organizations had over 500 employees, and the largest, a state-owned one, was far larger than the others. Except for this particular case, the two sectors had similar organizational size distributions; controlling for the effect of size did not change the results. Data were collected through interviews with a standard questionnaire.

The Sample

The study population consisted of CEOs of Israeli industrial firms having more than 100 employees. At the time of the study, there were 302 such firms in the country. Attempts were made to interview all their CEOs, but

only 141 fully completed the interview (a 47% response rate). All CEOs from both sectors were men and were similar in education and age. In both groups, about one-third (34% in the private sector, and 35% in the public) were under 48 years old, and about one-third (35% and 33%) were over 55 years old.

Measures

The public-private sector distinction was based on an organizational factor: ownership of voting shares (Rainey et al., 1976; Wamsley & Zald, 1976). In Israel, the public sector includes both government and Histadrut-owned organizations. The Histadrut—or federation of Israeli workers—is not only a federation of trade unions, cooperative movements, and a vast network of welfare services for workers, but also owns some large holding companies whose shares are distributed equally among Histadrut members. At the time of the study, the output of Histadrut enterprises constituted about 20 percent of the Israeli GNP. These corporations are, of course, subordinated to the Histadrut ideology of creating a workers' society for the benefit of all workers in Israel, and to accomplishing national goals (Daniel, 1976; Epstein, 1975). In this study, both government and Histadrut-owned enterprises were classified as public sector since both are ideologically inclined toward achieving goals of a collectivistic and national nature and not toward achieving maximum profits, as is the private sector. The public sector category included 40 industrial firms in which either the government or Histadrut held over 50 percent of the voting shares, and the private sector included 91 privately owned industrial firms. Ten firms could not be classified because of insufficient information on shareholding.

This study measured the influence of five main segments of the organizational environment: (1) government agencies: the ministries of finance, trade and industry, and the Investment Bureau; (2) government policies: five monetary, taxation, and incentives policies; (3) labor unions: workers' local committees and the national union; (4) market: five elements that represented open market forces—competitors, suppliers, distributors, clients and banks; (5) owners: shareholders and boards of directors. The question asked was: "How much influence do the following bodies have on your decision autonomy?" Possible responses ranged from 1 (high influence) to 15 (low influence); except for government policies, where they ranged from 1–12.

Time span of discretion was measured by the frequency with which CEOs reported to six controlling or comptroller agencies—parent company, state comptroller, ministries, stock exchange, Histadrut, or State Enterprise Authority. Scores ranged from 1 (low discretion) to 7 (high discretion). Frequency of reporting to controlling agencies is only one dimension of discretion and does not exhaust this concept, but unfortunately, no other measures of discretion that provided a better approximation of this concept were available; readers should bear in mind the limitation of this measure.

Job satisfaction was measured in terms of executives' attitudes toward their job rewards, using an intrinsic satisfaction scale that included 8 Likert-

type items ($\alpha = .76$) and an extrinsic satisfaction scale that included 10 Likert-type items ($\alpha = .82$). Item scores, which ranged from 1 (very satisfied) to 5 (very dissatisfied), were averaged for measures of intrinsic and extrinsic satisfaction.

RESULTS

Table 1, showing the mean scores and standard deviations of the eight measures by sector, indicates that the pattern of perceived environmental influences is very similar for the two sectors. Government policies stand out as the strongest influence on CEOs of both sectors (a score of 3.8 on a scale of 12); CEOs perceived other environmental influences on their decision-making autonomy as low. The only significant differences between the CEO groups appear for time of discretion ($t = 2.06, p < .05$), with the public group reporting less frequently to controllers, and for job satisfaction, with the public group less satisfied on both intrinsic ($t = 1.96, p < .05$) and extrinsic rewards ($t = 2.92, p < .01$).

It is interesting to note that even public sector CEOs perceived government agencies as the least influential of environmental factors, that the CEOs in the study distinguished government agencies from government policies, and that they attributed low influence to the former and high influence to the

TABLE 1
Means, Standard Deviations, and Reliability of Scales by Sector

Scales	Mean Scores			Reliability ^a
	Public	Private	Total	
Perceived influence ^b				
Owners	6.2 (4.1)	7.2 (5.1)	6.9 (4.8)	.65
Labor union	7.5 (4.4)	8.1 (4.2)	7.9 (4.3)	.74
Government agencies	10.2 (4.3)	9.2 (3.9)	9.5 (4.0)	.72
Market elements	8.2 (3.7)	7.8 (3.7)	7.9 (3.7)	.77
Government policies	3.8 (2.4)	3.8 (2.0)	3.8 (2.1)	.61
Perceived time span of discretion	5.9 ^d (1.5)	4.9 (2.8)	5.2 (2.5)	.81
Satisfaction ^c				
Intrinsic	2.4 ^d (.53)	2.2 (.54)	2.2 (.54)	.76
Extrinsic	2.4 ^d (.53)	2.1 (.54)	2.2 (.54)	.82

^aCronbach alphas.

^bThe higher the score the lower the perceived influence (high autonomy).

^cThe higher the score the lower the satisfaction.

^dMeans are significantly different from others at the .05 level or greater, two-tailed test.

latter. This result suggests that CEOs do not perceive government as exerting direct control over them, but rather as exerting indirect influence through policy formation.

Discrimination between Public and Private Sector Executives

A discriminant analysis of public and private sector CEOs found that three measures discriminated between the two CEO groups: (1) extrinsic job satisfaction (standardized discriminant coefficient, .82); (2) time span of discretion (-.52); and (3) intrinsic job satisfaction (.18). Wilks's lambda for the function was .837, canonical $r = .404$, $\chi^2 = 22.3$ (9 df, $p = .004$). The same three variables were also found to differ significantly for the two groups on the bivariate test. The low effect of intrinsic satisfaction was probably due to the high correlation between it and extrinsic satisfaction ($r = .73$), which led to some redundancy in the multivariate analysis. The five measures of environmental influence (government agencies, policies, owners, unions, and market elements) did not contribute to discrimination between public and private sector CEOs.

DISCUSSION

Differences in Environmental Perceptions

CEOs of public and private industrial enterprises in Israel perceive their functional environments, or at least those aspects of environment measured here, as similar, suggesting that sector affiliation may be unrelated to environmental perception. The lack of differences in CEOs' perceptions of political and market influences is particularly interesting. The assumption that publicly-owned organizations are more strongly influenced by government than are private ones is common because of their dependence on social legitimation, the political nature of the processes of resource appropriation, and the political and public scrutiny to which they are subject (Nigro & Nigro, 1977; Self, 1977; Zaleznik, 1979). Public organizations are also commonly considered to be less exposed to market influences (Rainey et al., 1976; Vernon, 1981; Wamsley & Zald, 1976). However, the present findings suggest not only that executives in the two sectors perceive the influences of government agencies similarly, but also that both perceive these influences to be fairly low. But both groups see the influence of government policy as high, and moreover, public sector CEOs do not perceive the influence of market elements (like banks, competitors, suppliers, etc.) as significantly weaker than do private sector CEOs. It seems, therefore, that CEOs of industrial enterprises perceive their role environments similarly, regardless of sector affiliation.

This similarity in CEOs' perceptions of their institutional milieu does not fit the interpretational framework of sector differentiation. Another theoretical framework, organization-environment interface, does however, explain the lack of differences. This theory suggests that the environment is an important determinant of organizational structure and management practices,

and presumes that similar task environments elicit similar organizational characteristics and managerial reactions (Burns & Stalker, 1961; Lawrence & Lorsch, 1967). Since the organizations in this study have similar task environments—they are all industrial, production-oriented organizations, of similar size and similarly distributed among technologies—their CEOs can be expected to perceive similar environments similarly. The differences that have been assumed to exist as to sector goals and objectives do not seem to be strong enough to elicit differential perceptions of otherwise similar task environments. If these commonly assumed differences do exist on the more abstract, normative level of sector goals, the CEOs' views of their institutional milieu do not seem to reflect them. One possible explanation is that there may be a gap between the prescribed overall goals of the public sector and the operational goals and behavior of its CEOs (Aharoni & Lachman, 1982).

Time Span of Discretion

Time span of discretion significantly discriminated between public and private CEOs, but the relationship was the reverse of that expected. Public sector CEOs had significantly longer time spans of discretion (less frequent reporting) than private sector CEOs. Although public sector CEOs are said to experience much public scrutiny and to have a high degree of accountability to the public, they have a higher degree of discretion than their private sector colleagues, at least in terms of frequency of reporting. As mentioned earlier, since this variable only partially measures managerial discretion, no final conclusion about discretion should be drawn.

Differences in Job Satisfaction

The main factor discriminating between the two CEO groups was personal satisfaction with job rewards. As hypothesized, CEOs in the public sector were less satisfied with both their extrinsic rewards (financial rewards and benefits, social and work relations, etc.) and their intrinsic rewards (job challenge, personal growth, sense of accomplishment, etc.). These findings are consistent with findings elsewhere that low and middle level management of U.S. government agencies were less satisfied with their work and co-workers than were managers of business firms (e.g., Buchanan, 1974; Rainey, 1983; Rhinehart et al., 1969). However, the present study does not support attribution of those findings to differences in sector milieu (e.g., Buchanan, 1974); this study found no differences in CEOs' perceptions of their institutional milieu. Furthermore, measures of job satisfaction were not correlated with measures of environmental influences. Differences in satisfaction may be attributable to differences in internal structures and processes, such as career systems, reward systems, or work design. For example, previous research has found that executives of public organizations have higher formalization, and less autonomy in hiring, firing, or rewarding, than do private sector executives (e.g., Rainey, 1983; Blumenthal, 1979). These limits could affect their levels of satisfaction. However, this

assertion should also be examined through comparison of similar organizations to see if differences in internal structures and processes reflect differences in business purpose or in sector affiliation.

IMPLICATIONS

This study examined the common assertion that the public-private differentiation of ownership provides a framework for the interpretation of frequently observed differences between managers of the two sectors. The results of comparing similar industrial organizations did not seem to support this assertion: no differences were found in CEOs' perceptions of the influence of institutions in their environment. If the commonly presumed differences between the institutional milieux of public and private organizations do exist on the more abstract, normative level of sector goals, they are not necessarily reflected in the executives' perceptions of role behavior. The high level of time span of discretion that this study found public CEOs enjoy may allow gaps to open between the sector's normative goals and its CEOs' operational goals. On a more practical level, the findings may imply that mere affiliation with the public sector does not necessarily assure executives' full commitment to the overall goals of the sector, and other means may be required to enhance this commitment (Aharoni & Lachman, 1982). These implications should be further investigated.

The findings also imply that the public-private distinction may not be a very useful conceptual framework for explaining differences in organization-environment interactions. Differentiating managers in terms of other factors (e.g., task, technology) as, for example, the theory of organization-environment interface suggests, may account for more differences in managerial behavior and perceptions than differentiating by sector affiliation does. Most of the previous studies that reported environmental differences between organizations from the two sectors (e.g., Buchanan, 1974; Guyot, 1962; Rainey, 1983) compared organizations having different task environments without accounting for this basic difference. Variation in task environment, rather than ownership differences, may have been the source of the reported differences. Hence, the interpretational framework of ownership distinction ought to be reexamined. However, the particular cultural context—Israel—of this study may have biased findings; their replication in another culture is desirable.

This study did find differences in work satisfaction between managers in the two sectors that earlier studies have commonly found. This replication, in a different cultural environment, and in organizations of the same functional type, considerably strengthens the proposition that the work attitudes of public and private sector managers differ. It seems that public sector managers at various organizational levels and even in various cultures perceive their job rewards to be lower than their private sector counterparts do. Higher formalization levels and less flexible internal managerial processes in the public sector as compared to the private may account for this difference, a proposition that future research should examine.

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EXECUTIVE SUCCESSION IN FAILING FIRMS

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Organizations' environmental contexts can influence their strategies and processes in a number of ways. Pfeffer and Salancik (1978) suggested that context can influence executive succession, because uncertainties, interdependencies, and contingencies in organizational environments affect distribution of power and control within organizations and this distribution, in turn, influences selection and replacement of top executives. Corporate chiefs can substantially affect major organizational characteristics, so their replacement can produce organizational change. A number of investigations on executive succession patterns have considered change in top management as a critical determinant of organizations' adaptive behaviors (e.g. Dalton & Kesner, 1983; Helmich, 1974; Helmich & Brown, 1972).¹

This study investigates executive succession in failing companies. The complex business uncertainties such companies face can cause redistribution or transfer of power within them. When corporate survival depends upon the continued support of bankers and other lenders, managers may have to relinquish considerable control over strategy decisions (Bibeault, 1982; Hughes, 1982). Outside stakeholders may insist upon top management changes as a condition of their continued support, or managers may consider resignation or early retirement as being in their own best interests (*Business Week*, 1983).

Although companies in financial distress may replace chief executive officers (CEOs) because of incumbent leaders' perceived inadequacies, there may also be a symbolic dimension to CEO change. Pfeffer and Salancik (1978) pointed out that top managers have symbolic roles in organizations and can serve as scapegoats, rewarded when things go well, fired when things go poorly. Replacing CEOs may help to change both internal and external perceptions of companies' images and help restore confidence in their futures.

¹See Gordon and Rosen (1981) and Helmich (1977) for reviews of this literature.

Two recent studies of the association between corporate performance and executive succession (Bibeault, 1982; Schendel, Patton, & Riggs, 1976) have indicated that management changes are a characteristic strategy in turnaround companies. Although external pressures on companies may necessitate replacing top management, such changes alone may not solve all of the problems that face companies in acute financial distress. The present study examines the frequency with which failing companies change CEOs in the years immediately preceding their filing for bankruptcy.

This study also looks at patterns of top executive succession in failing companies. Often, firms view selection of insiders as a maintenance or non-adaptive strategy, and believe outside successors will bring about needed radical changes. In studying patterns of executive succession, both Helmich and Brown (1972) and Dalton and Kesner (1983) found substantially greater proportions of insider than outsider replacements. Decision makers may perceive failing companies as needing new management teams with special turnaround skills to handle difficult situations and make crucial policy and strategy decisions. Executives possessing skills not found in existing management can appear more likely to succeed in overhauling operations—more likely, for instance, to be hard-nosed or to act as a hatchet man. The absence of such characteristics among existing management might result in failing companies seeking outside talent to help solve their problems.

Dalton and Kesner (1983) cited organizational size as an influence on executive succession patterns. Their argument suggests that large organizations are more likely than small firms to replace top management from inside, because the former have reservoirs of management talent, and also because their managers have more power to resist the imposition of outside chiefs than small firms' managers do. Moreover, the power and resources controlled by chief executives of large corporations might help to insulate them from external pressures and so prevent their ouster. Thus, the present study also tested for effect of firm size on the incidence of replacement of CEOs and the relative likelihood of insider or outsider succession in failing firms.

RESEARCH DESIGN AND RESULTS

This study used a basic matched-pairs design to compare executive succession choices in samples of failing and healthy firms. The failing firms were companies that had filed bankruptcy petitions during the years 1974 to 1982, and had their shares publicly traded in the years prior to bankruptcy on either the New York Stock Exchange or the American Stock Exchange.

Inspection of *The Wall Street Journal Index* for the years under consideration yielded a list of 140 bankruptcies. We had to exclude six companies from the sample because data were unavailable. The final sample of 134 bankrupt companies constituted a cross section of publicly held companies, approximately one-half of which were manufacturers, the others being retailers, wholesalers, transporters, or service concerns. The study excluded banks and savings and loan institutions because of the close surveillance and regulation to which they are subject. In all, sample companies repre-

sented over 70 industries in terms of four-digit Standard Industrial Classification (SIC) codes.

To develop a control group, we matched each bankrupt company with a nonbankrupt company that (1) was listed on either the New York or American Stock Exchange, (2) had the same four-digit SIC code as the bankrupt company, and (3) was nearest in revenue dollars to the bankrupt company's revenues for the fourth year before bankruptcy. The fourth year before filing was used because failing firms frequently report revenues in the years just before bankruptcy that are atypical of previous performance.

The study analyzed changes in CEOs during the three-year period immediately preceding the month of bankruptcy filing for each of the failing companies. We examined CEO changes in each control company for the three years that were the same as the ones studied for its matched bankrupt company.

Corporate annual reports, 10-K reports, and proxy statements provided data. In some cases these sources were not enough to identify CEO changes taking place in the months immediately preceding bankruptcy, so we relied on secondary sources such as *Leasco's Disclosure Journals*, *The Wall Street Journal Index*, and *Standard and Poor's Register of Corporations, Directors and Executives*. Data collected included announcement dates of CEO changes, circumstances of changes—that is, whether resignation, retirement, or death prompted them—and types of successors, insiders or outsiders.

CEO Turnover in Failing Firms

Our first hypothesis posited a tendency for failing companies to make CEO changes. We used a chi-square test for independence of classification to test the null hypothesis that there is no association between the classification of a firm as bankrupt/nonbankrupt and its tendency to change CEOs. Table 1, a contingency table, shows that 60 of the 134 bankrupt companies (about 45%) made CEO changes during the period studied, whereas only 25 (about 19%) of the control firms made such changes over that period. These results reject the null hypothesis ($\chi^2 = 21.1$, $p < 0.001$); financial distress is associated with a tendency to change CEOs.

TABLE 1
Association between Financial Distress and Changes in CEOs

	Bankrupt	Non-bankrupt	Row Totals
Changed CEO	60 (45%)	25 (19%)	85
Did not change CEO	74 (55%)	109 (81%)	183
Column totals	134 (100%)	134 (100%)	268

$\chi^2 = 21.1$, 1 df, $p < .001$.

An examination of the timing of changes in CEOs made by the 60 failing firms indicates that the closer companies get to filing for bankruptcy—that is, the more financially distressed they become—the more likely they are to change their CEOs. The 60 failing firms made 81 CEO changes in the three years preceding bankruptcy, 20 of which occurred in the third year before bankruptcy, 23 in the second year before. Then, in the year immediately before, the number of CEO switches increased to 38. Several failing companies made more than one CEO change during the period studied, evidence of the tenuousness of power during trying times.

Some CEO changes that took place in both the failing and control groups were due to normal retirement, or, in a few instances, death. To meet the argument that such an investigation should appropriately only consider replacement of chief executives for reasons other than normal retirement or death, we retested the first hypothesis under this narrower definition. Again, results strongly rejected ($p < 0.001$) the hypothesis of no association between firms' financial condition and decisions to replace their CEOs.

Insider or Outsider Succession

The next hypothesis to be tested dealt with the types of successors failing companies chose. We framed this null hypothesis: failing and nonfailing companies that changes CEOs display the same patterns in their choices of insiders or outsiders as successors. Table 2 shows the numbers of insiders and outsiders chosen in both groups. We classified companies that brought in at least one external CEO over the three years as having made outsider choices, and companies that chose only individuals from within their organizations as having made insider choices.

TABLE 2
Association between Financial Distress and Successor Type

	Bankrupt	Non-bankrupt	Row Totals
Choose insider as successor	21 (35%)	14 (56%)	35
Choose outsider as successor	39 (65%)	11 (44%)	50
Column totals	60 (100%)	25 (100%)	85

$$\chi^2 = 3.21, 1 \text{ df}, p < .07.$$

Results of a chi-square test of independence indicated rejection of this null hypothesis ($\chi^2 = 3.21, p = 0.07$). The results showed a higher incidence of outsider succession in failing firms than in solvent firms. In fact, 65 percent of the failing firms that replaced CEOs went outside their organizations for new CEOs at least once, compared with only 44 percent for control firms.

Corporate Size and Executive Succession

Dalton and Kesner (1983) presented results showing such choices of insiders versus outsiders to be a function of organizational size. We also tested for the effect of size on the choices as to type of successor that our failing and control firms made.

The measure of size was operating sales revenue. We used revenues in the fourth year before bankruptcy rather than in the year of bankruptcy since failing firms, as noted earlier in this study, frequently report revenues for the years immediately before bankruptcy that are atypical of their prior sales levels. We converted these revenues from nominal dollars to 1967 dollars, in order to ensure use of comparable figures—otherwise, we might have inappropriately compared 1970 dollars for some companies with 1978 dollars for others. The price-level adjustment was based on the *Consumer Price Index for Urban Customers*.

The 60 failing firms that had made CEO changes were ranked in order of adjusted sales size. We then applied the Wilcoxon rank sum test to determine whether failing companies that had chosen outsider CEOs came from a different size population than the failing companies that chose insiders. The test detected a statistically significant difference between the mean sizes of these two groups ($p = 0.06$, two-tailed test). The relatively larger failing companies that had made CEO changes displayed a stronger preference for external replacements than did the smaller failing companies.

When repeated for the 25 firms from our control sample that had made management changes during the study period, the test revealed no statistically significant difference between the mean sizes of firms that had chosen external CEOs and those that had chosen only insiders ($p = 0.26$). Thus, size did not have any effect on the type of successors chosen by these control firms.

The results of these tests appear to run counter to the findings of Dalton and Kesner (1983), who reported that the larger companies they studied were more likely to opt for insider successors than the smaller ones. Differences in the overall sizes of firms investigated may partially explain this inconsistency—that is, the large companies in our study and the large companies in the Dalton and Kesner study may not be of comparable sizes.

We can only speculate on the reasons why large failing firms may have greater propensities to select external CEO replacements than do small firms. Internal power structures may deteriorate more rapidly in large companies characterized by diffuse ownership than in small firms, and external stakeholders may be inclined to assume greater negotiating or controlling responsibilities because of the sizes of their claims. It does appear, though, that the importance of various influences on selection of new CEOs may be contingent on the financial conditions of firms.

Finally, the contention that CEOs of large companies have greater ability to resist replacement than their counterparts in small companies, and that large failing companies consequently make fewer CEO changes than small ones turned out to have no empirical support. We use the Wilcoxon test on

the sample of 134 failing companies to evaluate the effect of size on their tendency to make CEO changes. The null hypothesis could not be rejected ($p = 0.16$, two-tailed test). Repeating this test for the 134 control firms, we again found that size did not affect propensity to make top management changes ($p = 0.20$).

CONCLUSIONS

Financially distressed companies can respond to their mounting problems in many ways. The findings of this research indicate that one such response can be a change in top management—such changes were far more prevalent among failing firms than among their healthy counterparts. We also considered whether or not failing companies sought outsiders to replace their CEOs. Our findings indicate that, among failing companies, outsider succession is more likely than insider succession. In times of financial distress, companies seem to look for an external solution to their problems. Although firm size was not found to influence decisions to make CEO changes, the larger failing companies in our sample that made such changes displayed a greater preference for external replacements than did the smaller ones.

Top management changes are frequently symptoms of external or internal organizational crises. Our understandings of the dynamics behind executive succession can benefit from examining the behavior of crisis-ridden organizations. The findings of the present study, which focused on some companies whose very survival was threatened, demonstrate that such companies often try to solve their problems by making leadership changes. Further research on situational and contextual variables that may result in management changes should be pursued. The effectiveness of top management changes in reviving companies are likely to depend on the specific contexts of the companies and the characteristics of their new chosen leaders. Future research might examine the efficacy of making top management changes as a turnaround strategy by comparing companies that rebound with those that go into liquidation.

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EXIT BARRIERS AND VERTICAL INTEGRATION

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When exit barriers trap firms in an industry, the result is destructive competition and reduced profits (Harrigan, 1981; Porter, 1976). Mobility barriers often prevent firms from changing their strategic postures so as to serve new customers (Caves & Porter, 1976). For the purposes of this paper, the term exit barriers will refer to both mobility and exit barriers. High barriers of either type are likely to keep firms operating within an industry without changing their strategic posture even when they earn subnormal returns on their investments.

Vertical integration, the in-house production of goods and services that could be purchased from outsiders, has been regarded as a major source of exit barriers (Porter, 1980). No one has established the relationship between integration and exit barriers empirically, however, primarily because of an absence of appropriate variables in existing data bases (Caves & Porter, 1976; Harrigan, 1980). Moreover, a precise way of identifying and estimating the dimensions composing vertical strategies was lacking until recently (Harrigan,

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1983a). Consequently, only a partial model of the forces that raise exit barriers has been tested.

This paper brings together questions concerning exit and mobility barriers with those concerning vertical integration strategies in order to explore whether and when vertical integration constitutes an exit barrier. By identifying how the operative forces interact, it suggests how firms might cope with situations in which vertical integration can raise exit barriers. If firms can lower the height of exit barriers, they can reposition themselves to serve more attractive market segments or to exit with relative ease.

FORCES INFLUENCING EXIT BARRIERS

Previous studies have established that various economic, strategic, and managerial forces may influence the heights of exit barriers (Caves & Porter, 1976; Porter, 1976; Harrigan, 1980, 1981, 1982). The model tested later in this paper includes these forces as control variables; vertical integration strategy dimensions, described later in this paper, were added to the model for this study. A brief review of forces affecting the height of exit barriers and an explanation of new variables precede presentation of the model. Results testing the improved model are then presented and the implications of the results for managerial practice are discussed.

Economic Forces

Economic exit barriers are generally associated with technological factors such as capital intensity, asset durability and specificity, asset age, and technological or operating reinvestment requirements. Firms having the thinnest markets for disposal of their assets face the highest economic exit barriers, as many oil refiners did in 1982 (Harrigan & Porter, 1983). This research estimated the heights of economic exit barriers with a scale diseconomies measure—the magnitude of diseconomies incurred by operating 25 percent below engineered capacity. The earning power of plants with high diseconomies (.25 or more) will seem particularly poor if they are offered for sale during industry downturns (Harrigan, 1982), and consequently, firms' economic exit barriers will seem especially high when demand is declining. Table 1 describes the scale diseconomies measure and others and gives their expected signs.

Strategic Forces

Previous research has also established that the very characteristics that define a firm's strategic postures—attributes such as product differentiation, proprietary knowledge, goodwill-generating expenditures, and other investments once made to overcome entry barriers—often create strategic exit barriers. The value of these investments makes firms unwilling to exit, even when they suffer losses (Caves & Porter, 1976). Confronting high strategic exit barriers, the result of their having waited too long before revising their positions, these firms cannot recover the value of their past competitive efforts. This study used an estimate of relative product differentiation to

TABLE 1
Definition of Independent Variables Associated with Exit Barriers

Variable Names	Means	Standard Deviations	Expected Signs	Explanations	Hypotheses
Economic forces					
Diseconomies of scale	.1796	.1235	+	Percentage cost diseconomies incurred when facilities operate 25% below engineered capacity.	Manufacturing facilities subject to substantial cost diseconomies will be more difficult to divest.
Strategic forces					
Relative product differentiation	.3987	.2865	+	Scale of relative differentiation in which commodities are 01 and customized products are .99.	Highly differentiated products represent an intangible asset that raises the height of exit barriers.
Expectations					
Sales growth	-.0031	.0766	-	Average sales growth over five years, 1976-81.	Rapid growth reduces exit barriers.
Vertical integration variables					
Number of integrated stages	.8604	.4486	+	Relative (index) number of steps in transformation process the firm undertook.	Being involved in several stages of production increases the height of exit barriers.

TABLE 1 (continued)

Variable Names	Means	Standard Deviations	Expected Signs	Explanations	Hypotheses
Form of integrated venture	.8694	.2636	+	Percentage of ownership in the venture.	Compared to partially owned ventures, wholly-owned vertical links represent larger investments to be recovered when divesting; hence, higher exit barriers.
Degree of backward integration	.3471	.3421	+	Percentage of requirements the business unit obtains from upstream sister unit.	High degrees of backward integration increase pressures to buy in-house and are difficult to disrupt.
Degree of forward integration	.3669	.3872	-	Percentage of outputs the business unit sold to—or through—downstream sister unit.	High degrees of forward integration give firms greater control over exit because relatively few important customers will be alienated by their departure.
Synergies with upstream businesses	.1756	.2701	+	Percentage of resources shared with sister business unit upstream.	High degrees of shared resources increase exit barriers for the business unit in question.

represent firms' strategic exit barriers because it is an example of the benefits created by past image-building efforts that firms are often unwilling to abandon.

Expectations

Expectations concerning future demand greatly affect the market for assets to be sold as firms reposition themselves strategically or exit. When sales are growing, the height of exit barriers will be lower than when demand is declining. This study therefore used average sales growth to represent demand expectations.

VERTICAL INTEGRATION VARIABLES

This section introduces the attributes of vertical integration that were hypothesized to affect exit barrier heights. These attributes differ substantially from those associated with the old image of vertical integration, according to which operations are 100-percent owned, physically interconnected, and the source of all of a firm's needs (Frank, 1925; Jewkes, 1930; Lavington, 1925; Livesay & Porter, 1969). Vertical integration strategies can vary as to stages, degree, and form (Harrigan, 1985). The concept of stages represents the number and value of steps in the chain of processing from ultra raw materials to final consumers in which a firm's strategic business units (SBUs) are engaged. Degree of integration indicates what percentage of a particular upstream or downstream need an SBU satisfies through product or service transfers from or to sister SBUs. Form refers to a firm's proportion of equity in an SBU (Harrigan, 1985). Firms can use contracts, joint ventures, cooperative agreements, or other forms of quasi integration to control upstream or downstream units if they have sufficient relative bargaining power (Blois, 1972, 1980).

The effects of these dimensions of vertical integration upon exit barrier heights were tested with an ordinary least-squares regression model. Firms engaged in several stages of processing were expected to face high exit barriers with respect to the SBUs studied. Wholly owned vertical links were also expected to increase exit barrier heights, because they represent larger investments to dispose of than do links that are not wholly owned. High degrees of backward integration with sister SBUs were hypothesized to be more difficult to disrupt than high degree of forward integration, because of the dependency of upstream units upon the downstream SBUs' purchases.¹ There may be pressures from downstream SBUs for continuing supplies of an input, and firms are unlikely to sever downstream linkages unless they see a need for exit. Such a decision is most likely when customers no longer demand a substantial proportion of the downstream SBUs' outputs; successful firms

¹ I expect this effect because most upstream stages of processing (with the exception of crude oil exploration and production) face higher minimum efficient scale (MES) plant sizes than do corresponding stages downstream (Harrigan, 1983a.) The throughput volumes involved in the deintegration decision will seem more substantial than when downstream linkages must be severed.

that dismantle vertically integrated structures would be expected to close downstream facilities first (Harrigan, 1981).

In brief, high degrees of backward integration were expected to produce negative signs in the regression model tested later in this paper, but high degrees of forward integration were not. These hypotheses are consistent with findings from an earlier study of exit from declining businesses (Harrigan, 1981), in which strong customers, who could penalize a firm through other businesses if they were cut off, were the biggest single contributors to the height of exit barriers. In that study, successful firms were those that solved the problem of providing for laggard customers—the ones still using the outputs of a declining industry—before they exited.

Finally, access to new information concerning firms' vertical linkages facilitated a test of whether synergies raise exit barrier heights. Earlier studies (Caves & Porter, 1976; Harrigan, 1981) have found that shared resources—a measure of synergies—increased exit barrier heights. This study used resources shared with upstream SBUs to approximate synergies in the model tested.

In summary, this study develops measures of vertical integration not tested in previous studies of exit barriers and tests them with control variables representing forces that have previously been tested. The next sections sketch the sample, the model, and the results of this inquiry. Findings suggest how an improved understanding of the relationship between vertical integration and exit barriers can affect strategic flexibility and repositioning behavior.

METHODS

The Sample and Variable Construction

A sample of 192 SBUs from 16 industries was the focus of analysis. Firms were distributed as follows: residential solar heating, 6.8%; coal gasification, 4.2%; genetic engineering, 10.4%; personal computers, 7.8%; ethical pharmaceuticals, 10.4%; whiskey distilling, 6.3%; petroleum refining, 16.0%; electronic receiving tubes, 2.6%; baby foods, 3.1%; electric percolator coffee-makers, 4.2%; cigars, 3.6%; leather tanning, 4.7%; synthetic soda ash, 3.1%; acetylene, 6.3%; and rayon, 4.2%. Although most SBUs were from different firms, there were a few instances in which more than one SBU belonged to the same firm. Because the industries of the target SBUs were highly diverse, different individuals scaled each industry using delphi procedures.²

A hybrid research program that combined field interviews, published documents, and a three-round delphi study yielded information concerning

² Delphi procedures (Delbecq, Van de Ven, & Gustafson, 1975; Holmer, 1967) provide refined values for measures that have been gathered from several respondents who all estimated the value of the same phenomenon or attribute. By providing respondents (1) with information concerning results or average values obtained from other panelists in the previous round of estimation and (2) the opportunity to revise their estimates in light of others' evaluations of the same attribute in the next round of data gathering, improved measures of variables not in the public domain may be developed.

the relationships between the SBUs and adjacent business units.³ Briefly, the judges for the delphi study included managers familiar with the target industries and with vertically related business units; outside suppliers; outside customers; trade association executives; industry analysts; and industry observers. They were very familiar with relationships within the vertical chain of processing that they were asked to score and revised their estimates for the variables defined in Table 1 three times in the light of the average value from the previous round. As in most delphi studies, there was a high decay rate as the rounds progressed (Delbecq, Van de Ven, & Gustafson, 1975; Holmer, 1967). The 276 judges who participated in the first round became 92 by round three. All judges scaled only SBUs in their area of expertise.

As the judges reassessed each variable, they discussed their reasoning, thereby providing additional insights concerning vertical integration relationships. To reduce problems arising from heteroscedasticity, variable estimates were scaled to values between .01 to .99 for most variables.

The dependent variable, exit barrier heights in 1981, indicates the judges' assessments of the difficulties firms would encounter in changing their strategic postures, closing plants, or exiting completely from the target industries. The mean value of the exit barrier variable was .495, with a standard deviation of .245. Independent variables (described in Table 1) were scaled similarly using the procedure described in the preceding paragraphs.

Limitations of the Study

The many differences among industries in structural and strategy variables call for conservatism in the degree of confidence that can be placed in these data. Although great care was taken in conducting the study, delphi is an inherently subjective research methodology, and the findings should therefore be interpreted with caution.

The Models

The relationships of expectations, economic and strategic forces, and vertical integration variables with the height of exit barriers were tested in a regression model. In this ordinary least-squares specification, the sign and the magnitude of the coefficients (b_i) indicate contributions to the height of exit barriers, and standardized coefficients represent relative contributions to the coefficient of multiple determination. The model is stated by:

$$y = a + b_i x_i + e ,$$

where y equals the estimate of exit barrier height, and b_i (with $i = 1, 2, \dots, 8$) is the coefficient of each economic, strategic, expectations, or vertical integration variable, respectively.

³ Details of the research methodology, variable construction, and sample design are reported in Harrigan (1983b, 1985a).

RESULTS

Control Variables

Economic forces. The results in Table 2 indicate that the scale diseconomies variable is positively signed and statistically significant, as expected. This finding suggests that keeping both plants and critically skilled laborers fully employed is substantially important in allowing firms to maintain the flexibility to reposition or sell out with ease. From field interviews, it appeared that in the oil refining industry, where plants of minimally efficient scale processed large volumes of throughput (175,000 barrels per day), firms incurred high operating costs when refineries ran at low levels of capacity. Such unfavorable economics exacerbated the difficulties oil firms faced when they tried to dispose of excess facilities.

TABLE 2
Results^a for Regressions on Height of Exit Barriers

Variables	Natural Coefficient Estimates	Standardized Regression Coefficients
Economic forces		
Diseconomies of scale	1.0829***	.5449
Strategic forces		
Relative product differentiation	.3640***	.4249
Expectations		
Growth in sales	-.3472	-.1083
Vertical integration variables		
Number of integrated stages	.1034***	.1890
Form of integrated venture	.0884*	.0949
Degree of backward integration	.1327**	.1849
Degree of forward integration	.0667*	.1028
Synergies with upstream businesses	-.1388***	-.1527
Intercept	-.0087	
Coefficient of multiple determination (R^2)	.4550	
F-statistic (183 df)	19.10***	

* $p = .10$

** $p = .05$

*** $p = .01$

Strategic forces. Product differentiation, used as a proxy for the strategic forces hypothesized to create exit barriers, was positive and statistically significant, as expected. This finding suggested that those firms that had the largest stakes invested in R&D and other intangible assets—that is, firms that differentiated their products effectively—would face the greatest impediments in changing their competitive postures, closing plants, or exiting completely. In brief, intangible sunk costs act like economic sunk costs when firms let them increase the height of exit barriers.

Expectations. The sales growth variable was negatively signed and statistically significant, as expected. This suggests that firms' exit barriers increase substantially when demand is declining. In earlier studies, firms that recognized this change and acted upon it quickly suffered fewer difficulties in exiting (Harrigan, 1980). Expectations also affect the ability of firms in embryonic and emerging industries to change strategic postures by influencing opportunities to raise capital or dispose of obsolete assets.

Vertical Integration Variables

Number of stages undertaken. The number-of-vertical-stages variable was positively signed and statistically significant, as expected; it appears that being engaged in several stages of processing creates inflexibilities that can be avoided by using outsiders for some steps. In doing so, firms remain more able to adapt to changes in technology and demand.

Form of ownership. The percentage-of-ownership variable was positive and statistically significant, as expected. Firms with relatively low-equity investments in a venture, like importers and bottlers in the whiskey distilling business, could reposition themselves or exit with greater ease.

The experiences of firms in the acetylene industry provided examples suggesting that the relationship between percentage of ownership and height of exit barriers might be curvilinear, however. In that industry, one significant advantage of owning downstream SBUs completely was that wholly owned operations were easier to shut down than jointly owned physically interconnected facilities were in the joint ventures, parties had to agree upon the timing and other conditions surrounding a business unit's shutdown. In the acetylene industry case, writing contracts that extended for the life of supply contracts seemed a preferred means of avoiding the unwieldiness of operations that could not be fully owned.

Degree of backward integration. The backward integration variable was positively signed and statistically significant, as expected. High degrees of internal transfers from upstream sister SBUs increase the height of exit barriers by exacerbating pressure caused by excess capacity in upstream plants. This condition creates higher barriers than do relationships with downstream sister SBUs because upstream plants' minimum efficient scales (MES) are larger than are downstream plants'. If few outlets exist for dumping the excess outputs created by imbalances between vertically related SBUs, firms with high degrees of backward integration are more likely to start price wars to dispose of excess outputs and inventories. Exit barriers were highest among coal gasification firms, for example, when transmission and distribution companies lacked other supplies of natural gas and had been highly dependent upon upstream SBUs for the bulk of their raw material requirements. These firms experienced the greatest difficulties in repositioning themselves when the energy crisis of the 1970s was relieved and need for their products dwindled (Harrigan, 1983).

Degree of forward integration. The sign of the variable for degree of forward integration and internal transfers was negative and statistically significant, as expected. Selling much of an SBU's outputs to in-house customers does not raise the height of exit barriers. Also, downstream intrafirm linkages are easier to overcome than upstream intrafirm linkages.

High degrees of forward integration were not a significant exit barrier in the electronic receiving tubes industry, for example, because firms had made arrangements to protect crucial outside customer relationships without incurring high asset inflexibility (Harrigan, 1980). In other industries where firms contemplated exit from vertically integrated businesses—or strategic repositioning—they often began implementation by terminating or divesting their low-margin, downstream operations first, in order to ease their way out of unattractive investments.

Downstream SBUs often had a better sense of the true nature of demand, and effective firms exploited this market intelligence. For example, two gas distribution firms created parallel entities to operate their regulated and unregulated businesses in order to monitor the effects of regulation more closely than they had previously.⁴ Following redefinition of SBU boundaries, one of the firms spun off its local gas distribution company and thereafter sold it natural gas from the pipeline company in transactions that recognized market prices, as though they were dealing with a third party and not a member of the family.

Synergies with upstream businesses. The variable for synergies with upstream businesses was statistically significant and had a negative sign, an unexpected result. Previous studies (Caves and Porter, 1976; Harrigan, 1981) have found that shared facilities raise the heights of exit barriers. In the present sample, cross-tabulation analysis revealed that 79 percent of the target SBUs shared few resources less than 30 percent—with upstream sister SBUs. Sixty-two percent of SBUs in this sample shared no resources. Chi-square tests showed no significant pattern of relationships between backward integration synergies and the height of exit barriers.

Three industry examples may explain this puzzling and unexpected statistical result. Although synergies with upstream sister SBUs were high in genetic engineering and personal computer SBUs, exit barriers were trivial because the shared resources in question were primarily scientific personnel, or engineers and programmers, who could be transferred without great cost; physical assets were primarily general purpose laboratory or electronic equipment that could easily be used elsewhere. In the third example, SBUs producing residential solar heating panels, the physical assets used to make the product were primarily screwdrivers and other inexpensive tools found in general purpose shops, and SBUs consumed a very small part of their parents' total copper outputs, if their metals needs were supplied in-house.

⁴ Local rules concerning noncurtailment of residential service were sapping profitability in this example.

All of these examples are from young industries; it appears that businesses can share resources with upstream sister SBUs in young industries without facing high exit barriers. This result perhaps suggests that using vertical integration to exploit synergies may be less risky for pioneering entrants than is generally recognized.

CONCLUSIONS AND IMPLICATIONS

Results suggest that a high degree of internal transfers from upstream sister SBUs raises the heights of exit barriers. They also suggest that exit barriers will be higher for firms engaged in many stages of vertically related processing—particularly where the business unit in question is fully owned—than for firms that are not so engaged. These dimensions of vertical integration strategies can be added to the roster of forces that create high exit barriers.

Even firms in young industries must take care to sustain strategic flexibility. When products must be modified frequently, or when technology changes rapidly, high degrees of backward integration—intrafirm transfers—could hamstring SBUs at the precise time when they need to change inputs and processes quickly. Vertical arrangements need updating as do other dimensions of competitive strategy. If firms want their SBUs to supply or buy from each other, they should frequently reexamine their premises for such arrangements, because the strategic window that favored vertical integration can close.

Firms can act early and purposefully to lower exit barriers by limiting the degree, stages, and percentage of ownership that characterize their vertical relationships. An orderly and incremental withdrawal of investments from SBUs that once served as suppliers or distributors for other SBUs can reduce exit barrier heights, particularly if outsiders can be persuaded to undertake these tasks. Strategists must scan the effects of vertical integration on strategic flexibility just as they scan other forces that erect exit barriers.

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RELATIONSHIPS BETWEEN CONCESSION BARGAINING AND LABOR-MANAGEMENT COOPERATION

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In the last few years, much attention has been focused on collective bargaining's adaptation to severe economic adversity. The recent recession has prompted union-negotiated concessions of unprecedented degree and scope (Capelli, 1983; Mitchell, 1982; Rubinfeld, 1983). Research indicates

that employers have also made concessions, often on a quid pro quo basis with unions (Kassalow, 1983; Mills, 1983; Raskin, 1982; Rubinfeld, 1983; Woodworth, 1983). Along with these concessions, many firms have also added a wide variety of union-management cooperative arrangements, ranging from programs to increase quality of work life or worker participation in decision making, to gainsharing and profit-sharing plans (U.S. Department of Labor, 1982). The coincidence of new cooperative arrangements, so slow to emerge in the past, and concession bargaining, also previously fairly uncommon, has caused some observers to predict that union-management relations will become less adversarial than they have been (Kochan and McKersie, 1982; University of California Institute of Industrial Relations, 1983). However, others believe that when economic conditions improve, unions will press for traditional bargaining relationships, as they did in the 1984 automobile industry negotiations (Craft, 1983; University of California Institute of Industrial Relations, 1983). Whether this occurs will depend largely on the degree to which union officers believe that the quality of their relationships with management has improved because of the joint activities and new forms of bargaining that emerged during the recession (Strauss, 1984). In this research note, we examine some recent data on concession bargaining and cooperative programs and analyze the effects of these practices on attitudes about the quality of labor-management relations.

Several studies have concluded that economic adversity and impending financial crisis primarily motivate concessions and cooperative plans (Brett & Hammer, 1982; Jacoby, 1983; Raskin, 1982; Rubinfeld, 1983; Shuster, 1983). However, although employers' claims of economic adversity may prompt concession negotiations, union officers' agreeing to make concessions depends on their seeing management as credible. Union officers, who tend to be suspicious of arguments for concessions, often consider such management bargaining positions to be opportunistic. Management generally must persuade unions that crisis is near (Rubinfeld, 1983). Such persuasion is more likely to succeed in trustful, not hostile, climates. Accordingly, we would expect to see union concessions where management has agreed to make concessions, or where cooperative programs exist, as these both would enhance management's credibility and increase trust between the parties. In such cases, we would also expect that union officers would perceive the quality of labor-management relations to have improved.

Thus, we expect that:

Hypothesis 1: Economic adversity alone will not guarantee union concessions and changes in attitudes about the quality of union-management relations.

Hypothesis 2: The incidence of union concessions will be positively related to the incidence of management concessions or cooperative programs.

Hypothesis 3: The quality of labor-management relations as perceived by union officers will be positively related to

implementation of management concessions or cooperative programs in addition to union concessions.

METHODS

As part of a larger study, a questionnaire was mailed to 273 presidents of local unions connected with New England manufacturing companies that had negotiated collective agreements in 1981 or 1982. The sample came from the Bureau of Labor Statistics' regional lists of enterprises having 200 or more employees and engaged in negotiations. We received responses from 69 (25.3%) of the union local presidents whose companies were still operating in their areas. The questionnaire dealt with (1) union officers' perceptions of the economic conditions their companies faced, (2) quality of their unions' relationships with management, (3) types of concessions and cooperative programs they had discussed or implemented in 1981 or 1982 negotiations, and (4) mechanisms used to negotiate these matters.

The questionnaire listed various types of union concessions, management concessions, and collaborative programs and asked respondents to indicate which of these had been discussed, accepted, or rejected. We verified union officers' responses by getting the responses of plant managers at the same facilities to a similar questionnaire, and by interviewing certain responding plant managers and union officers.

The respondents' companies, which represented the wide diversity of New England's industries, included manufacturers of machinery, paper and paper products, electrical components and appliances, transportation equipment, fabricated metals, food, textiles, lumber, steel, rubber, and plastics. The union respondents' bargaining units ranged from 65 to 1800 employees; about half had fewer than 250 employees, and only six had over 1,000 employees. Locally negotiated agreements covered 62 of the 69 union locals whose presidents responded. Two locals were in regional bargaining structures, and five were in national units; in these broad units, some local level negotiations probably also occurred within two-tiered systems. Most of the agreements respondents had signed in 1981 or 1982 were for two years (19 cases) or three years (42 cases).

RESULTS

Role of Economic Adversity

Our first hypothesis was that although economic adversity stimulates both labor and management to consider various concessions and cooperative programs, economic conditions alone cannot guarantee union concessions. Our questionnaire asked respondents to indicate the frequency of union concessions, management concessions, and cooperative programs. Among the union concessions listed were changes in work rules, scheduling, or staffing, and reductions or freezes in wages and benefits. Management concessions listed included reductions or freezes in managers' salaries or benefits, management layoffs, the opening of company financial records, and growth

of union participation in management decision making. Cooperative plans listed included quality of worklife programs, quality circles, profit sharing, and gainsharing. We also asked union presidents to indicate their perceptions of the degree of economic hardship their companies currently faced. Respondents used a 5-point scale that ranged from 1 (extremely depressed economically) through 3 (somewhat affected but not serious) to 5 (doing very well in spite of the recession). Fifty-one percent of the respondents checked 1 or 2, indicating that their firms faced extremely adverse economic conditions; 49 percent indicated less difficulty with responses of 3, 4, or 5. However, we found no statistically significant differences between these groups with respect to frequency of concessions, cooperative programs, or specific types of programs. Union officers bargaining with firms facing extreme economic difficulties indicated the following: 60 percent reported union concessions; 49 percent reported management concessions; and 40 percent reported cooperative programs. Those reporting less severe economic conditions indicated 47 percent, 44 percent, and 47 percent, respectively, for the three possibilities. We also found no statistically significant differences between the two groups when comparing the specific types of concessions or programs reported within each category. Thus, it seems that extreme economic adversity by itself does not increase the likelihood of concessions or cooperative programs.

Reciprocal Concessions and Cooperative Programs

Hypothesis 2 suggested that when management makes concessions or sets up cooperative programs, unions are more likely to make concessions than they might otherwise be. Our questionnaire asked respondents to indicate the types of concessions and cooperative programs implemented during the 1981 and 1982 contract negotiations period. Although this study could not identify the precise times all concessions occurred, follow-up interviews indicated that parties either made or discussed concessions at approximately the same time, or that management concessions and cooperative programs preceded union concessions.

Table 1 shows that union concessions are significantly more likely where management has made concessions before or during negotiations than where they have not. Further, implementation of cooperative programs between labor and management before or during negotiations somewhat increases the likelihood of union concessions, but the relationship is not statistically significant. The association of management concessions and union concessions may indicate use of quid pro quo strategies in collective bargaining processes. Or this association may imply that unilateral management concessions help convince labor of a serious need for changes in the status quo, and so foster a more collaborative problem-solving environment, than would otherwise exist.

Quality of Union-Management Relationships

This study's third and most important hypothesis suggested a positive relationship between quality of labor-management relationships and inci-

TABLE 1
Frequency of Union Concessions When Management
Concessions and Cooperative Programs Are Implemented^a

	Union Concessions		Totals
	Yes	No	
Management concessions			
Yes	33%	13%	46%
No	20%	33%	53%
Totals	53%	46%	99% ^b
$\chi^2 = 6.68; p < .01^c$			
Cooperative programs			
Yes	25%	19%	44%
No	29%	28%	57%
Totals	54%	47%	101% ^b
$\chi^2 = .04; n.s.^c$			

^an = 69.

^bTotals do not equal 100 percent because of rounding.

^cYates corrected chi-square analysis.

dence of management concessions or cooperative programs. Our introductory discussion also suggested that economic adversity might lead to positive changes in relationships between unions and managements by bringing out the mutuality of their interests in hard times.

Our questionnaire asked union officers about the quality of their relations with management both immediately before 1981 and in early 1983, the time of questionnaire administration. Possible responses ranged from 1 for very unsatisfactory, hostile, low trust; to 5 for very good relationship, high level of trust, mutual respect. Overall, union officers reported an average improvement of .73 on the 5-point scales. Those union officers whose companies were seen as facing extreme hardship reported an improvement of .80, and those from less hard-pressed firms reported an improvement of .65—results with a statistically insignificant difference. Thus, although the results' trend is in the expected direction, we cannot conclude that difficult economic conditions alone make for improved union-management relationships.

To test Hypothesis 3, we compared the perceived quality of labor-management relationships in companies that implemented concessions or cooperative programs during 1981–82 and in companies that did not. The responses of our 69 union local presidents indicated a 1.31 improvement in the perceived quality of union-management relationships where management had made concessions ($t = 2.88, p \leq .006$); a 1.30 improvement where cooperative programs had been implemented ($t = 2.68, p \leq .009$); and a 1.0 improvement where unions had made concessions ($t = 1.58, p \leq .12$). Thus, although all concessions and cooperative programs improved the perceived quality of labor-management relationships, the positive association was most dramatic with management concessions or cooperative programs. The relationship was not statistically significant for union concessions.

Although it is difficult to prove causality in these relationships, we speculate that management concessions and cooperative plans may improve union-management relations, and union concessions may follow this improvement. We did not test this causal interpretation, but did examine the relative strengths of (1) the association between management concessions, cooperative programs, and union concessions and (2) changes in the perceived quality of union-management relationships. Table 2 shows results. After controlling for incidence of management concessions and cooperative plans, we found that incidence of union concessions did not have a statistically significant association with the relationship between concessions and improvement. These results suggested that management concessions and cooperative programs are more closely associated with improvements in the perceived quality of union-management relationships than union concessions are.

TABLE 2
Effects of Concessions and Cooperative Plans
on Average Change in Quality
of the Labor-Management Relationship^a

(a) Management Concessions		Union Concessions	
$p = .006^b$	Yes (1.31) $n = 32$	n.s. ^b	Yes (1.44) $n = 23$
			No (1.00) $n = 9$
	No (0.22) $n = 37$	n.s. ^b	Yes (0.29) $n = 14$
			No (0.18) $n = 23$
(b) Cooperative Plans		Union Concessions	
$p = .009^b$	Yes (1.30) $n = 30$	n.s. ^b	Yes (1.65) $n = 17$
			No (0.85) $n = 13$
	No (0.28) $n = 39$	n.s. ^b	Yes (0.45) $n = 20$
			No (0.11) $n = 19$

^aAverage change in quality of labor-management relationship is reported in parentheses.

^bTwo-tailed t test of significance.

How Concessions Are Negotiated

Union officers also indicated whether concessions or cooperative programs were negotiated through traditional collective bargaining or in special joint committees. We found that in 64 percent of the cases collective bargaining was used to negotiate union concessions, and that special committees worked out management concessions and cooperative programs in 84 and 86 percent of the cases, respectively.


CONCLUSIONS

The results of this study suggest that economic adversity alone neither improves the quality of labor-management relationships, nor brings about union or management concessions, or cooperative programs. However, incidence of concessions and cooperative programs is associated with improvement in the perceived quality of labor-management relationships. Although causality is difficult to prove, it seems that cooperative programs and management concessions enhance union officers' perceptions of the quality of these relationships and may also increase the likelihood of union concessions.

It would also appear that different mechanisms are most effective in negotiating union concessions on the one hand and management concessions or cooperative programs on the other. Collective bargaining appears more conducive than other means to discussions of union concessions on wages, fringe benefits, schedules, and so forth. Management concessions, such as staff cutbacks and salary freezes, and cooperative programs, such as QWL efforts, quality circles, profit-sharing, and the like, are more often and perhaps better discussed in specially created committees that are outside of adversarial collective bargaining frameworks.

Our conclusions are based on results from a small sample of union officers in fairly small companies of one geographic region. Further research is needed to substantiate these results. However, to the extent that we can generalize our results, they imply that if American labor and management are to benefit from the hard-learned lessons of the latest recession, they should continue to explore ways to reduce their mutual mistrust and to enhance the quality of their relationships. This study suggests that if either group uses economic hardships solely to elicit distributive concessions, rather than to form more collaborative relationships than have existed in the past, no fundamental change in union-management relationships will occur, and the recent wave of concessions and cooperation will be short-lived.

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COMPOSITION OF DYADS AS A FACTOR IN THE OUTCOMES OF WORKPLACE JUSTICE: TWO FIELD ASSESSMENTS

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Although procedural justice in the workplace has been a topic of increasing interest (e.g., Aram & Salipante, 1981; Ewing 1977a, 1977b; Folger & Greenberg, 1985; Gordon & Miller, 1984; Smith, 1983; Walker, Lind, &

Thibaut, 1979), it has received surprisingly little empirical attention. Existing research on workplace justice, however, does lead to a disquieting conclusion: There may be systematic differences in workplace justice outcomes that are associated with the genders of involved employees (e.g., Dobbins, Pence, Orban, & Sgro, 1983; Larwood, Rand, & Hovanessian, 1979; Rosen & Jerdee, 1975).

Systematic differences based on gender in outcomes of disputes or disciplinary actions between employees and organizations may have critical consequences. Larwood and colleagues, for example, commented on this aspect of disciplinary action:

Presumably, any evaluation which results in either sex being judged more harshly than the other will place that group at a disadvantage with respect to future personnel decisions.

Ideally, organizations will judge dispute or disciplinary cases on their merit and the gender of employees involved will not affect outcomes. There is some evidence, however, that this is apparently not the case.

Rosen and Jerdee conducted a simulation designed to determine the influence of appellants' gender and the type of appeal on managers' evaluations of grievances. They concluded that male employees may have considerably more flexibility than female employees as to choice of appeal for "restitution of organizational inequities" (1975:445). In another experiment (Larwood et al., 1979), subjects taking the role of personnel managers examined vignettes in which hypothetical employees had made rather substantial errors in judgment and indicated their preference for one of four disciplinary outcomes—discharge, transfer, suspension, or demotion. It was reported that managers would more readily take disciplinary action against women than men. Rosen and Jerdee concluded that "career women may have little margin for error, unlike men in traditional male employment roles" (1979:540). A more recent laboratory investigation addressing gender-related differences in the use of corrective action (Dobbins et al., 1983) reported that leaders responded more intensely, using stronger control procedures, towards women subordinates than towards men.

All three simulations suggested that women may receive less favorable treatment than men in the adjudication of disputes and disciplinary proceedings. This is a potentially severe indictment. Before concluding that organizational members who are women are subject to such bias in workplace justice proceedings, three issues should be considered: (1) the scarcity of research addressing workplace justice procedures and outcomes; (2) the lack of field investigations of these procedures and outcomes; and (3) the dynamics of gender composition in workplace justice proceedings.

As to the first issue, a conventional caution applies that little can be responsibly concluded about workplace justice outcomes given the modest amount of examination that has occurred. As for the second issue, the lack of field assessments of workplace justice processes and outcomes, we note that prior studies in the area (Dobbins et al., 1983; Larwood et al., 1979; Rosen & Jerdee, 1975) have been simulations designed for laboratory protocol. This a

potential concern inasmuch as a tendency for results obtained under laboratory protocol to be inconsistent with those in field settings has been noted (Osborn & Vicars, 1976; Wendelken & Inn, 1981).

In fact, two recent field assessments of workplace justice may be interpreted as some evidence of this inconsistency. Beyer and Trice (1984), in a field study of the use of discipline in the workplace reported, among other things, that female employees were actually less likely to be suspended or discharged than their male counterparts. Another field assessment (Dalton & Todor, 1985) reported that women in the workplace were far more likely than men to prevail in dispute and disciplinary hearings. These results were invariant across both the severity and viability of the dispute. Notice that both field reports (Beyer & Trice, 1984; Dalton & Todor, 1985) conclude that women in the workplace are more likely to be treated somewhat more favorably than men in disciplinary actions and disputes. The previously reviewed simulations reached substantially different conclusions—that women receive harsher treatment.

The third issue concerns the dyadic composition of actors in a dispute or disciplinary action in workplaces. Larwood and colleagues (1977) and Rosen and Jerdee (1975) noted differences in justice outcomes as a function of gender. Dobbins and colleagues (1983), however, suggested that to examine only the gender of employees to determine if that factor is systematically related to dispute and disciplinary outcomes is insufficient. They suggested that the "sex composition of the leader-subordinate dyad is a critical variable which must be considered when examining the use of control processes" (1983:325).

Although only Dobbins and colleagues (1983) noted a relationship between dyadic gender-composition and aspects of workplace justice, other investigations have reported fundamental differences between same-gender and cross-gender interactions (e.g., Bem & Lenney, 1976; Jacobsen, Antonelli, Winning, & Opeil, 1977; Kimble, Yoshikawa, & Zehr, 1981; Mai-Dalton, Feldman-Summers, & Mitchell, 1979; Stitt, Schmidt, & Price, 1983; Yamada, Tjosvold, & Draguns, 1983). The analytical question, then, is: Are there systematic differences in workplace justice outcomes (1) as a function of the genders of involved employees and/or, (2) as a function of the gender composition of those who adjudicate disputes and disciplinary proceedings?

HYPOTHESES

In order to assess the effects of gender on outcomes of workplace justice proceedings, it is necessary to identify some organizational process that regularly and systematically addresses issues of discipline or dispute. The grievance process seems especially well-suited for these purposes.

The grievance process is a formal mechanism by which employees can appeal disciplinary action—termination, suspension, and the like—or receive a hearing for allegedly unjust treatment. This process has a characteristic that especially recommends it as a means to examine gender effects in

workplace justice: It allows for separate consideration of employees making appeals from those who actually adjudicate the problems.

The relationship, if any, between genders of employees making appeals and outcomes can be determined. However, dyads of a union representative and a company supervisor, not grievants, actually resolve the disputes (Dalton & Todor, 1979, 1982a, 1982b). Therefore we can independently examine the effects of the genders of grievants and the effects of the dyadic composition of the actual adjudicators. Thus, we can investigate the following:

Hypothesis 1: The proportion of workplace justice outcomes in which employees prevail will vary according to the gender of grievants.

Hypothesis 2: The proportion of workplace justice outcomes in which employees prevail will vary according to the gender composition of the adjudication dyad.

METHODS

This study used two separate field samples. Since variables used for both were the same, this section and the Results section discuss both samples. The first sample included all grievances ($N=310$) filed during one year by employees of a western public utility who were members of a large labor union local. The second sample included all grievances ($N=222$) filed by employees over a year in a large western labor union. Archival sources provided the data for both sets of grievances, which came from separate labor union locals representing different constituencies from different companies.

Measures

Gender. For each dispute or disciplinary hearing, the gender of the grievant was determined.

Gender of dyad. The gender of the union representative and supervisor assigned to the dispute were also determined. There are four possible dyadic configurations: supervisor and union representative both men; supervisor and union representative both women; supervisor a man, union representative a woman; supervisor a woman, union representative a man. These configurations, then, constituted the same-gender and cross-gender dyads.

Grievance resolution. This variable has five possible outcomes: win, compromise, lose, withdraw, or abandon. For analytical purposes, several of the resolution categories are the same. Although there are technical and legal differences among lost, withdrawn, and abandoned actions, the outcome is the same from the viewpoint of the grievant whose demands have not, and will not, be met. For analysis, then, these categories can be combined (Dalton & Todor, 1981, 1982a, 1982b).

Compromises, however, do present a problem. Deciding that a given compromise represented a favorable or unfavorable outcome for an employee is hazardous at best. For instance, is a five day suspension reduced to a three

day suspension favorable or unfavorable? Certainly, inspection of the grievance itself would not lead to a responsible determination. Grievances resolved by a compromise, therefore, were excluded from the analysis.

RESULTS

The results provided no support for Hypothesis 1, that there will be systematic differences in workplace justice outcomes based on grievants' gender. In fact, in neither sample did main effects emerge for gender of grievant (sample 1: $F = 1.16$, n.s.; sample 2: $F = 2.07$, n.s.), union representative (sample 1: $F = 0.22$, n.s.; sample 2: $F = 1.22$ n.s.), company representative (sample 1: $F = 1.07$, n.s.; sample 2: $F = 1.43$, n.s.), nor were there any interactive effects. The results did, however, support Hypothesis 2, that there will be systematic differences in outcomes as a function of gender composition of the actors—union and company representatives. Table 1 illustrates the magnitude of proportional differences in outcomes related to gender composition. Grievants in sample 2, who won 63.3 percent of the time and lost some 36.7 percent, prevailed much more often overall than the sample 1 group. There was, however, a striking similarity between the groups in the pattern of outcomes by dyad. The most dramatic results showed that when supervisors who were women interacted with union representatives who were men, these adjudicators were almost half again less likely to decide in the grievant's favor than were the other dyads.

It appears, then, that there are gross differences in workplace justice outcomes as a function of the gender composition of the adjudicators. Important confounds, however, such as viability of grievances and their severity could have influenced these results.

TABLE 1
Proportions of Favorable Workplace Justice Outcomes
as a Function of Dyadic Gender Composition of Adjudicators

Gender Composition of Dyads	Percentage of Outcomes in which Grievant Prevails	
	Sample 1 ^a	Sample 2 ^b
Supervisor and union representative both men	39.0%	68.8%
Supervisor and union representative both women	32.2%	51.1%
Supervisor a woman, union representative a man	15.6%	37.2%
Supervisor a man, union representative a woman	32.7%	77.8%

^a71.3% of supervisors are men; 28.7% are women.

^b65.8% of union representatives are men; 34.2% are women.

^c54.4% of supervisors are men; 35.6% are women.

^d51.4% of union representatives are men; 38.6% are women.

Viability of Grievances

The first potential confound concerns viability. It is naive to suggest that all disputes represent cases with an equal probability of being won. Individuals sometimes file over trivial matters. Moreover, grievances do at times have a certain nuisance value (e.g., Dalton & Todor, 1981, 1982a, 1982b). It may be that female supervisor/male union representative dyads, for example, systematically handled less viable complaints—those with a low *a priori* probabilities of outcomes favorable to grievants. The observed differences may reflect those dyads having reviewed less viable cases than other dyads did, rather than reflecting effects of dyadic gender composition.

Examining grievances themselves will not reveal relative viability, which probably cannot be assessed directly (Dalton & Todor, 1985). For a reasonable surrogate measure, we noted how many levels a grievance had proceeded before its resolution (Dalton & Todor, 1981, 1985). This measure, however, only approximates viability: In certain circumstances, such as when positioning for negotiations, a union might pursue otherwise hopeless actions through several levels.

Severity of Grievances

The severity of the issue antecedent to a dispute or disciplinary proceedings is another possible confound in this research. Although it may be true that one dyadic composition or another is associated with different outcomes, it may also be true that there are systematic differences in the nature of disputes and disciplinary proceedings that would affect their outcomes. It would not be surprising to find that less serious matters are more likely than serious ones to end favorably for grievants. For analytical purposes, we established two distinct types for severity of grievances. The first category, serious, refers to matters that were disciplinary and job-threatening—for example, suspension, termination, or disciplinary memorandum. The second category were neither job-threatening nor disciplinary. Previous research (e.g., Dalton & Todor, 1981, 1985) provided evidence of gross differences in outcomes based on this distinction. Table 2 illustrates the results of an ANCOVA analysis of workplace justice outcomes and gender composition, with covariates being severity and viability of grievances. These results indicate that both severity (sample 1: $F = 37.2$, $p < .001$; sample 2: $F = 35.5$, $p < .001$) and viability (sample 1: $F = 7.90$, $p < .01$; sample 2: $F = 29.5$, $p < .001$) are predictive factors for workplace outcomes for both grievance sets. Still, for both samples the main effects for gender composition of dyads also persist.

DISCUSSION

These similar results from two separate field settings have potentially serious implications. To suggest that workplace justice outcomes are systematically related to the gender composition of those individuals charged with hearing cases is disquieting. Moreover, it appears that differences are robust and invariant despite levels of severity and viability of grievances. We report

TABLE 2
ANCOVA Analysis of Workplace Justice Outcomes
with Viability and Severity of Grievances as Covariates

Source of Variation	Sum of Squares	df	F
(a) Sample 1			
Viability of dispute	7.07	1	37.30***
Severity of dispute	1.50	1	7.90**
Gender composition	0.71	1	3.72*
(b) Sample 2			
Viability of dispute	5.43	1	29.50***
Severity of dispute	6.54	1	35.51***
Gender composition	1.50	1	8.16**

* $p < .05$

** $p < .01$

*** $p < .001$

only a phenomenon here—the dynamics that may account for these results remain unexplored. There is some evidence that interaction styles may differ with gender composition of interacting dyads (eg., Davidson & Duberman, 1982; Kimble et al., 1981; Wiley & Eskilson, 1982; Yamada et al., 1983; Zammuto, London, & Rowland, 1979).

Zammuto and colleagues (1979), for example, may provide some insight. From a laboratory study, they reported that the gender composition of supervisor/employee dyads was an important predictor of the nature of conflict resolution strategies these actors adopted. Also, Kimble and colleagues (1981) reported that verbal patterns of assertiveness differed as a function of whether individuals in a dyad were of the same or different genders. It may be that the nature of such strategies for conflict resolution accounts for differences in outcomes.

Although their magnitude and their consistency for two field samples may enhance confidence in these results, they should be interpreted with caution. We have relied on a focused measurement of workplace justice. The grievance process is an important justice procedure for many employees, but it by no means exhausts the remedies that employees have in modern organizations in their disputes with management. Also, although the archival sources that provided these data did allow control for severity and viability of grievances, individual factors such as experience and training of union and company representatives remain unconsidered.

The modest amount of organizational research conducted in this area, the inconsistency in reports generated from laboratory versus field protocol, and the practical and legal implications of the results of the present study suggest that replications including alternative forms of workplace justice may be fruitful areas for future investigation.

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THE EFFECTS OF THE TYPE AND AMOUNT OF INFORMATION IN SEX DISCRIMINATION RESEARCH: A META-ANALYSIS

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For the past several years and for obvious reasons, there has been much research about discrimination in workplaces. These studies, which examine the relationship of factors such as gender, race, age, and handicaps to personnel decisions, are essentially designed to test whether or not there is bias in hiring, promotion, or other equally important career or work decisions. These studies have rather similar designs: subjects taking the role of a personnel decision maker are asked to decide which applicant from a group of men and women is most suited for a job. To present stimuli, experimenters use resumes, in-basket problems, sometimes videotapes, and, rarely, a field setting. This

body of research has not been particularly helpful in resolving the question of discrimination in selection, as the studies are almost evenly divided—about half show that discrimination occurs and half show otherwise.

After an extensive review of this research, Arvey (1979) suggested that, in general, women are evaluated more poorly than men, except when evaluators have information about qualifications of candidates. Then, the competence of candidates plays a major role in assessment. This suggests that differences in the results of these studies could be a function of the amount and type of information that individuals have for deciding between men and women applicants. When judges have limited information, they are more likely to base a decision on sex-role stereotypes, favoring men over women for jobs that men have traditionally done, but when applicant information is not so limited, there is little need to rely on stereotypes (Renwick & Tosi, 1978). If this is so, the logical argument that follows is that those studies showing discrimination provided judges with less information and more gender-salient cues than those studies that showed no discrimination.

This paper tests the proposition that raters faced with more job-relevant information about an applicant and a job will make less biased decisions than raters faced with less job-relevant information. After reviewing the research on unfair discrimination, Arvey raised the following question: "Does the amount of information about candidates and jobs affect differential evaluation?" (1979: 761). The following analysis indicates that the answer is yes.

METHODS

Study Pool

Studies included in this analysis came from *Psychological Abstracts* and the *Social Science Citations Index*, both of which we reviewed from 1970 to the current date. In addition, we examined the reference sections of studies and review papers, especially Arvey (1979), for possible additional sources. The main criterion for inclusion was that the research be a field study or laboratory experiment designed to test for sex discrimination in some stage of personnel selection. Other research exists on both race and gender bias in performance appraisal, and on race bias in selection, but the present study did not include these domains because a meta-analysis must restrict the scope of studies considered to those having the same dependent and independent variables (Hunter, Schmidt, & Jackson, 1982)—here selection bias and gender, respectively. Table 1 summarizes the 21 studies that were found to meet these requirements.

Dichotomization of Studies

Each study was reviewed and classified according to the results obtained. In the studies considered, researchers had been meticulous in their use of experimental controls to ensure that subjects (raters) received comparable data about men and women, except for the independent variables. Studies in

which men were rated higher than women could therefore be classified as showing discrimination, and the remaining studies were classified as showing no discrimination. Rosen and Jerdee, for example, designed controls to give any candidate "an even chance of being accepted or rejected" (1974: 511). Therefore, in the absence of bias, raters should have chosen women as often as men, and given both similar ratings. If men were chosen more frequently than women, or given higher ratings, the conclusion was that discrimination based upon gender, rather than competence, determined the ratings. Table 1 lists studies in the two groups.

The Type and Amount of Information

This study's conclusions rest completely upon our approach to evaluating the information that participants used to reach decisions in the studies we included. We carefully reviewed each study to determine the amount of information judges had and whether or not each piece of that information was gender-salient.

As for amount of information, the number of factors included for any study contained its independent variables plus any other reported factors that judges may have used for decision making. For example, although Renwick and Tosi (1978) manipulated four independent variables—gender, marital status, undergraduate degree, and graduate degree—in our judgment, two other factors that paper reported were particularly relevant to the hiring decisions. These were type of job and grade point average. Thus, we included six factors for this study.

Such an approach raises a critical issue. There was little problem with including independent variables in our count of information, but we had to make a judgment about each additional factor. Such judgments had to derive from analysis of the published reports, but an author's style or a journal's space policy could cause substantial variations among similar reports. Published reports of two experiments, designed with the same number of independent variables and providing subjects with the same amount of total information would, no doubt, both identify their independent variables. But if one author's style were briefer than the other's, or if one journal's review process or space policy required shortening a paper, we might count a different number of factors for the two studies in our review. For instance, we report that subjects in the study by Heilman (1980) evaluated three pieces of information, as did the subjects in Cohen and Bunker's (1975) study. However, Cohen and Bunker had subjects evaluate an interview transcript that no doubt contained other data we would have counted, had we known its contents. Clearly it would be best to have original study protocols, but, as this was impossible under the circumstances, a crucial assumption was necessary: that the amount of information evaluated by judges in any study was the same as the number of factors appearing in the written report.

Next, each factor included was evaluated and designated as gender-salient or not. Information judged to be gender-salient embodied a stereotype based on gender, or could easily be used as a basis for such stereotyping. For

TABLE 1
Summary of Studies Analyzed

Study	Participants	Relevant Variables ^{a,b}	Dependent Variables	Gender-salient Information Index
I. Studies showing no discrimination				
Fidell (1970)	147 chairs of psychology departments	Gender ^a 4 qualifications ^b Job type ^b	• desirability of candidate	.16
Dipboye, Fromkin, & Wilback (1975)	30 college students 30 professional interviewers	Gender ^a Attractiveness ^a 3 qualifications ^b Job type ^b	• hire decision • rating	.33
Terborg & Ilgen (1975)	36 college students	Gender ^a Job type ^a 4 qualifications ^b	• decision to hire • starting salary	.33
Heneman (1977)	144 college students	Gender ^a Job type ^a Test score ^b	• overall suitability • hire/not hire • confidence in hiring decisions • recommended salary	.66
Dipboye & Wiley (1977)	66 college recruiters	Gender ^a Job type ^a Interviewee style ^b	• recommendation for hiring • likeability • qualifications • evaluation of training and experience • suitability	.66
Muchinsky & Harris (1977)	100 undergraduate psychology students	Gender ^a Type of job ^a 3 qualifications ^b	• recommendation to hire	.40

^aGender-salient information.

^bNot-gender-salient information.

TABLE 1 (continued)

Study	Participants	Relevant Variables ^{a,b}	Dependent Variables	Gender-salient Information Index
Sands (1978)	169 professional recruiters, men	Gender ^a Job style ^a Competency ^b Interviewee style ^b	• evaluation • employment decision	.50
Dipboye & Wiley (1978)	134 undergraduate business students, men	Gender ^a Job type ^a Interviewee style ^b	• recommendations for hiring • likeability • qualifications • suitability • evaluation of training and experience	.66
Dipboye & Wiley (1978)	86 MBA's, men	Gender ^a Job type ^a Interviewee style ^b Experience ^b Training ^b Academic achievement ^b		.33
Renwick & Tosi (1978)	80 graduate students	Gender ^a Marital status ^a Job type ^a Undergraduate major ^b Graduate degree ^b GPA ^b	• ratings of general suitability	.50

^aGender-salient information.^bNot-gender-salient information.

TABLE 1 (continued)

Study	Participants	Relevant Variables ^{a,b}	Dependent Variables	Gender-salient Information Index
II. Studies showing discrimination				
Shaw (1972)	64 college recruiters	Gender ^a Type of job ^b	• hire rating	1.00
Rosen & Jerdee (1974)	235 undergraduate business students	Gender ^a Job demands ^a Job type ^a	• overall rating • potential for technical aspect • potential for tenure • potential for fitting in • hiring decision • performance evaluation • adjective rating • qualified for job • predicted success • hiring recommendation • hire rating • hire choice	1.00
Cohen & Bunker (1975)	150 job recruiters	Gender ^a Type of job ^a Interview transcript ^b		.66
Cash, Gillen, & Burns (1977)	72 personnel consultants	Gender ^a Type of job ^a Attractiveness ^a		1.00
Dipboye, Arvey, & Terpstra (1977)	96 college students	Gender ^a Attractiveness ^a GPA ^b Work experience ^b Job type ^b		.40
Rose & Andiappan (1978)	75 undergraduate business students	Gender ^a Sex of subordinates ^a Job type ^a	• overall success • tenure • keep customers satisfied • keep subordinates satisfied	1.00

^aGender-salient information.^bNot-gender-salient information.

TABLE 1 (continued)

Study	Participants	Relevant Variables ^{a,b}	Dependent Variables	Gender-salient Information Index
Zikmund, Hitt, & Pickens (1978)	100 personnel managers	Gender ^a Job style ^a Scholastic standing ^b	<ul style="list-style-type: none"> total number of company replies number of positive replies qualifications 	.66
Heilman & Saruwatari (1979)	45 undergraduate administrative science students	Gender ^a Applicant attractiveness ^a Job type ^a	<ul style="list-style-type: none"> hire decisions salary recommendations qualifications 	1.00
Heilman (1980)	100 MBA students	Gender ^a Composition of applicant pool ^a	<ul style="list-style-type: none"> recommendation for hiring potential 	1.00
McIntyre, Moberg, & Posner (1980)	458 companies	Job type ^a Gender ^a Job type ^b	<ul style="list-style-type: none"> 6 responses ranging from no response to request for interview overall rating 	.50
Cann, Siegfried, & Pearce (1981)	244 undergraduate psychology students	Gender ^a Attractiveness ^a Job type ^a	<ul style="list-style-type: none"> hire decisions trait ratings 	1.00

^aGender-salient information.^bNot gender-salient information.

example, education would be gender-salient if subjects evaluated one set of applicants who attended Smith College and another set who attended West Point, but if applicants were all said to attend state universities—likely to be coeducational—education would not be gender-salient.

The present study categorized information as gender-salient if it met one of three conditions. First, the independent variables which were experimentally manipulated indicated gender salience. For example, Cohen and Bunker (1975) manipulated job type by having subjects evaluate men and women candidates for either a position the researchers expected to be occupied by men (personnel technician) or women (editorial assistant).

Second, in some instances classification as gender-salient or not-gender-salient followed researchers' stated intent, even though they had not experimentally manipulated the factor. For instance, Heneman had subjects review candidates for the position of "life insurance agent... because it is a male oriented job with a sales force that was predominantly male" (1977: 524). Job type was not gender-salient in the study by Dipboye, Arvey, and Terpstra because, "subjects were given a job description that stated in sex-neutral terms the duties and requirements of the position" (1977: 289).

Finally, if neither of these two conditions were present, we made a judgment on the basis of our reading of the study and sense of whether or not a cue was gender-salient. For example, if the job for which candidates were being judged was managerial, technical, or professional, it was classified as gender-salient because "the attributes believed to characterize successful managers [and, most other professionals] are more often those ascribed to men than those ascribed to women" (Heilman & Saruwatari, 1979: 361). Such a classification strategy, of course, allowed a variable of the same class, such as job type, to be gender-salient in one study (e.g., Muchinsky & Harris, 1977) and not-gender-salient in another (e.g., Fidell, 1970). Table 1 lists both classes of factors for each study.

RESULTS

The studies were subjected to a meta-analysis with the Fisher exact probability test, an approach selected over the assessment of effect sizes discussed by Hunter and colleagues (1982) for several reasons (Hunter, 1983): (1) the Fisher test is simple and direct; (2) the sample size in the studies that are reviewed is generally relatively large, reducing error variance; (3) because these studies are for the most part within-subject designs, tests of significance have greater power than assessment of effects.

The first analysis, shown in Table 2, assesses the relationship between discriminatory results and amount of information. Studies were dichotomized into two groups on the basis of amount of information. One group had four or more factors, and the other group had fewer than four. Of the 11 studies that showed discrimination, 10 fell into the less-information category. Of the 10 studies that showed no discrimination, 7 presented judges with more than four pieces of information and 3 had three or fewer pieces of information. There was a significant difference ($p < .01$) in evaluation by judges.

in the two groups of studies,¹ a result that clearly showed that more information is related to less discrimination. Further, when only gender-salient information was given, results were in the expected direction. The mean amount of gender-salient information was significantly greater ($t = 1.813, p < .05$) for the studies showing discrimination ($\bar{x} = 2.45, s.d. = .69$) than for the studies that did not ($\bar{x} = 2.0, s.d. = .45$).

This analysis suggests that amount and type of information shapes the results of these studies. In studies that present relatively more gender-salient information, discrimination occurs. On the other hand, Table 2 shows that there is a lower likelihood of discrimination when information that is not gender-salient figures in judges' evaluative set. To examine the effects of the relationship between gender-salient and total information, the present research used as an index the outcome of the number of gender-salient factors divided by the total number of factors (see Table 1). When gender-salient information was the larger portion of the total information, this index would be high, and it would be low when a judge reviewed more information that was not gender-salient than information that was. Thus, studies that showed bias should have a higher index than those that did not; indeed, the index for the studies showing discrimination ($\bar{x} = .84, s.d. = .24$) was larger than that for the studies that did not show discrimination ($\bar{x} = .45, s.d. = .18$). There is a statistically significant difference between the indices ($t = 4.31, p < .05$).

TABLE 2
Relationship between the Total Amount of Information
and Discrimination in the Studies Reviewed

Classification of Studies	Amount of Information		
	2-3 items	4-6 items	Totals
Showing discrimination	10	1	11
Showing no discrimination	3	7	10
Totals	13	8	21

DISCUSSION

Other very important empirical and social issues concerning discrimination that must be resolved are beyond the scope of this paper; Arvey (1979) addressed many of them. The present study reconciles some seemingly divergent research results using a form of meta-analysis.

When grouped in terms of the amount of information presented to subjects, the diverse studies made some sense—indeed, results are strong. Judges faced with limited information about competence or job requirements

¹ We determined the significance level from Table I, Siegel (1956: 256-70). This is a convenient equivalent to the computation because the computation is generally tedious.

tended to make biased or stereotyped judgments; those with more information did not.

This result is consistent with the distinction attribution theory makes between controlled and automatic attentional processes (Feldman, 1982). Individuals are said to use one or the other process to evaluate information, with the context of the information determining which process is used. Through these processes, individuals assign actors to categories on the basis of a satisfactory match between an actor and a category prototype (Tversky, 1977).

The automatic process, a cognitive process that occurs without conscious monitoring or awareness, is evoked by attention to overlearned information associated with people and their attributes. Such overlearning is a function of attribute and personal salience. If individuals perceive the attribute gender in isolation from other job-relevant information, they may assign women to a femaleness category that, realistically or not, does not contain attributes such as technical qualifications and experience that certain jobs are commonly thought to require.

When a judge is faced with a relatively large amount of salient information, such categorization may not be so simple, and the controlled process, a cognitive and behavioral process characterized by awareness of salient information and conscious control, occurs. A set of "cues which imply, if not contradictory, then at least negatively correlated categorizations" (Ilgen & Feldman, 1983: 156) may evoke this process. Individuals assign categories relatively consciously and deliberately. Given a relatively large amount of information, individuals must assess gender-salient information that they might use to relegate a woman to a female-probably-not-qualified category along with other salient information like training and experience. We suggest that such task-salient characteristics would then be the primary attributes on which individuals would base judgments.

This explanation may resolve inconsistencies between ratings women received in selection studies and those they got in performance studies (Arvey, 1979). When raters judged actual performance, they evaluated women more favorably than they did in the research we have reviewed in which judgments usually occurred in contrived laboratory situations. It seems quite reasonable to argue that the salient information judged by raters in performance studies were outcome measures likely to lead to assignment to either high- or low-performing categories. Task-salient outcome information would easily override an automatic process that would lead to "female" categorizations.

An additional word of caution is warranted. As was already noted, this analysis relies heavily upon our judgments about amount of information and its character—whether or not it is gender-salient. If our assumptions and interpretations were correct, the conclusions are warranted. But because cross-study analyses do have limitations (Hunter et al., 1982), a more systematic investigation than the present study should be done. A laboratory experiment could easily test the present study's hypotheses; it would not be diffi-

cult to manipulate both amount and type of information to determine if, indeed, there is less bias with more data. Still, the present study's finding is positive: judges are less likely to evaluate competence in terms of gender, and more likely to base judgments upon qualifications when individuals being evaluated have qualifications and judges know that they do.

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ATTITUDINAL DIFFERENCES AMONG WORK SHIFTS: WHAT DO THEY REFLECT?

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The issue of how attitudinal differences among work shifts should be interpreted is important from both pragmatic and research points of view.

This paper is based on data obtained in a larger project headed by Dr. Basil S. Georgopoulos, Principal Investigator. This project, a comparative study of hospital emergency services, was supported by Research Grant No. HS 02538 from the National Center for Health Services Research, OASH, NSPHS-HEW. The comments on a previous version of this paper by Howard Gitlow, Chuck Kurucz, and Saroj Parasuraman are greatly appreciated.

Managers would find it helpful to know whether negative staff attitudes on one shift—perhaps an 11 P.M. to 7 A.M. shift—are inevitable, or due to potentially changeable characteristics of a particular department or organization. Much previous research supports the idea that problematic attitudes are inevitably characteristic of night shifts. Dunham (1977) reviewed a considerable body of research concerning shift work that emphasizes difficulties associated with the life style of people whose work hours deviate from the 9 to 5 norm. Researchers have reported physiological and behavioral difficulties, as well as work and non-work attitudinal difficulties, to be associated with both rotating shifts and stable work hours other than 9-5 (Colligan, Frockt, & Tasto, 1979; Jamal, 1981). These difficulties have been variously attributed to disruptions in physical processes like circadian rhythms, or to isolation from society-at-large, oriented as it is to daylight work and business hours (Frost & Jamal, 1979). To find explanations of attitudinal differences among workers on various hospital shifts, the present study tries to ascertain the relative importance of (1) the effects of overall characteristics of time of day, and (2) the effects of particular social structures and processes associated with specific combinations of department and shift. Data comes from a sample of hospital emergency units.

The issue of differences among shifts raises a broad research issue: what unit of analysis should be used to study organizations that operate 24 hours a day? Simultaneous consideration of variables at many levels of analysis makes for important problems in generalizing results, and inferring their conceptual meaning, as well as in determining the most appropriate statistical procedures for hypothesis testing (Dansereau, Alutto, Markham, & Dumas, 1982; Hammond, 1973). Ordinarily, organizational scientists focus on either individuals or organizations as basic units of analysis (Lichtman & Hunt, 1971). As Parasuraman, Drake, and Zammuto (1982) suggested, separate work schedules are an aspect of differentiation in health care systems that may contribute to a social and psychological separation among shifts (Parasuraman & Alutto, 1981). Herman, Dunham, and Hulin (1975) indicated that attitudes specific to particular shifts may reflect distinct characteristics of supervision in a department's various shifts. Overall, shifts have many characteristics that suggest that researchers consider them both as separate subsystems and as part of departmental or organizational systems.

Emergency-Unit Shift as a Level of Analysis

Registered nurses working in hospital emergency units provided data for the present study. There are some ways in which leadership, management, and administrative procedures in different shifts are likely to be similar. In many hospitals, for example, one emergency unit supervisor, a head nurse, is responsible for all three of a unit's shifts. Similarly, only one chief physician, one nursing administrator, and one emergency-unit committee are typically formally responsible for the unit. In other respects, however, there may be important differences among shifts in work conditions and associated attitudes.

Some aspects of work characteristics and leadership in emergency units may vary systematically by shift. First—except in units that consistently rotate staff among shifts—the doctors and nurses who are expected, either formally or informally, to be leaders, and the quality of leadership they provide, are likely to vary among different shifts. Second, the work load, patient mix, and ratio of doctors and supervising nurses to other nurses may vary from shift to shift. Consequently, the demands on people who are expected to provide leadership may vary substantially among shifts.

The purpose of this study is to determine which of the following three hypotheses best characterizes work attitudes and perceptions in different emergency-unit shifts:

Hypothesis 1 Work attitudes tend to be more favorable in one kind of shift, for instance, first or day shifts, than in others, for instance, third or night shifts.

Hypothesis 2: Work attitudes tend to be particularly favorable in particular shifts of particular emergency units, but not in one kind of shift in general.

Hypothesis 3: There are no systematic differences in work attitudes among kinds of shift or among particular combinations of emergency unit and shift.

METHODS

The data were collected as part of a study of Hospital Emergency Services funded by the National Center for Health Services Research (Georgopoulos, Cooke, & Associates, 1980). Data were from a sample of short-stay, not-for-profit, general hospitals having 100-499 beds, and located in Michigan, Indiana, Ohio, Illinois, Wisconsin, or Minnesota. Thirty hospitals of 44 initially chosen to represent the defined hospital population provided data, yielding a 68 percent participation rate. Use of sampling strata ensured proportionate representation of (1) each state; (2) three different hospital size ranges, 100-199 beds, 200-299 beds, and 300-499 beds; and (3) both urban Standard Metropolitan Statistical Areas and rural areas outside SMSAs. In the participating sample, hospitals in the 100-199 bed range are somewhat overrepresented, and those in the 300-499 bed range are slightly underrepresented. Sources of data were both a questionnaire administered to registered nurses and interviews with them. In general, organizational problems, such as strain, were measured with the questionnaire, and problem-solving mechanisms, such as leadership, were measured with the interview. This use of separate instruments allowed for methods differences in testing hypothesized associations. Of the eligible nurses in participating hospitals, 278 gave interviews and 272 answered questionnaires, for respective response rates of 98 and 95 percent.

Variables and Measures

Survey measures were designed to reflect variables that have been postulated to either (1) vary systematically with the time of day a person works or (2) to vary with organizational characteristics of particular shifts. To derive the measures described below, principal components factor analysis with varimax rotation, and complete-linkage cluster analysis were applied to a set of items intended to measure attitude constructs. Results of these grouping procedures suggested four meaningful composite measures of the intended constructs. The average of responses to component items served as the measure for each composite.

The measure of doctor-nurse relations included three items addressing the extent to which nurses perceived doctors as understanding their work needs, adequately explaining patients' needs, and involving nurses in joint planning ($\alpha = .67$). Previous research (Peterson, 1979) had found these items to be associated with conceptually-related perceptions of work situation among nurses, or with independent respondent groups' evaluations of emergency-unit medical leadership. Doctor-nurse relations may vary by hospital or shift, and may not even be particularly consistent within hospitals, because typically, medical staff rotate erratically in emergency units, and even staff assignments to an emergency unit may vary irregularly.

The measure of role integration included four items: nurses' perceptions of their responsibilities; their perceptions of how appropriately their work time is divided; the extent to which they and the hospital similarly view their role; and tension between them and administration ($\alpha = .65$). These items help identify role conflicts, difficulties associated with task assignments, or role misunderstanding (Argote, 1979). Differences among shifts as to work load, patient conditions encountered, and ready availability of medical, administrative, and support services from the hospital all can affect emergency nurses' role experience. The first three of the items included in the role integration measure were significantly correlated, at the unit level of analysis, with supervising nurses' accounts of how well an administration understood a unit's work problems; the fourth was significantly correlated with a parallel question asked of LPNs.¹

The three items composing the intergroup tension measure investigated tension among nurses, as well as tension nurses experienced in relation to doctors and hospital staff outside the emergency unit ($\alpha = .64$). These items showed correlations, often statistically significant, with parallel measures derived from other respondent groups—emergency-unit doctors, hospital doctors, and administrators.²

The three items that measured nurse satisfaction ($\alpha = .58$) were also significantly correlated with other measures of nurses' perceived work situation and role.³ Satisfaction and tension measures were intended to reflect

¹ Data concerning these correlations are available from the author.

² Data concerning these correlations are available from the author; also, see Peterson and Cooke (1981).

³ These data are available from the author.

any advantages or difficulties associated with particular shifts or hospital-shift combinations that might have attitudinal implications. The societal isolation and physiological disruption noted in previous studies of shift work, and possible work differences among shifts, might all affect these variables.

Although the measures have low correlations with one another at the individual-unit level of analysis, this study achieved considerable success in developing relatively discrete, if not completely orthogonal, measures. The variance shared among the measures ranged from 8 to 15 percent.

Most of the items measuring role-related variables, strain and tension, and management and social outcome variables were either taken directly or adapted from instruments used in previous health care studies (Georgopoulos & Mann, 1962; Georgopoulos & Matejko, 1967; Georgopoulos & Wieland, 1964). These previous studies indicated differences in these variables among hospitals stratified by number of beds, religious affiliation, or geographic location, among other ways.⁴

Shift was measured by a question that asked nurses if they currently worked on a day shift, afternoon (evening) shift, night shift, or rotating shifts. Analysis did not include 27 respondents who indicated a rotating shift assignment.

Analysis

A three-step procedure (Andrews, Morgan, Sonquist, & Klem, 1973; Hicks, 1973) was used to assess differences among shifts and the value of treating hospital-shift combinations as a separate level of analysis. The procedure basically involved comparing the variance in responses explained by emergency units and shifts combined additively with the variance explained by all combinations of hospital and shift. First, one variable representing the 30 hospitals, and a second representing the three shifts, served as categorical predictors of each attitude (columns 2 and 3, Table 1). Second, the additive combination of these two predictors was assessed by multiple regression to determine the total criterion variance explained by their direct effects (column 4). The third step involved combining hospitals and shifts to assess the total variance in each variable explained by all combinations of hospitals and shifts (column 5). Comparing the first and second steps yielded the incremental variance explained by hospital or by shift. If the shift had more predictive ability than the emergency unit, attitudinal differences among shifts could be interpreted in terms of characteristics common to particular shifts in all hospital emergency units. A comparison of the results of the second and third steps, to determine the variance explained by the interaction of hospital and shift (column 7), revealed differences between the variance explained by (1) hospital and shift combined additively and (2) by the total of all hospital-by-shift combinations. If differences among all hospital-by-shift

⁴ The texts of questions used in this study and additional convergent and discriminant validity information are available from the author; also see Peterson (1980) and Peterson and Cooke (1981).

combinations were greater than differences among hospitals and shifts combined additively, differences among shifts in a particular hospital reflected differences in the management practices or social systems in that hospital, not inherent characteristics of particular emergency-unit shifts. Also, such differences would indicate that a shift level of analysis may be an empirically valuable supplement to organizational level analysis.

Five of the columns in Table 1 contain different indicators, either η^2 or R^2 , of the variance explained by hospital, by shift, or by their additive or total combination. The other columns contain the number of respondents or the number of predictor categories used to calculate the statistics that indicate variance explained. All cells containing only one person were eliminated.

Figures representing explained variance were obtained in somewhat different ways. The R^2 statistics in columns 2 and 3 reflect separate estimates of the variance explained by dummy-variable regression. A separate dummy variable regression including both hospital and shift dummy variables yielded the R^2 statistics in column 4. An analysis-of-variance program gave the η^2 statistics in column 5. Both the η^2 and R^2 estimates of variance explained used comparable least-squares computational algorithms. The η^2 estimates used traditional analysis of variance procedure, and the R^2 estimates involved an analysis of variance represented by a pattern variable entered as a set of predictors in regression format so that any multicollinearity among predictors was controlled.

RESULTS

The best single predictor of individual nurses' responses to the questions represented in Table 1 was the emergency unit—that is, the hospital—they worked in. Three of the four variables considered differed significantly among emergency units.

The shift on which a nurse usually worked generally explained very little variance, 2 percent at the most, and no significant differences among shifts appeared. Thus, shift contributed little when combined additively with the hospital predictor. Results do not support hypothesized main-effect differences in attitudes associated with shift.

The total combination of hospital and shift explained more variance in the nurse satisfaction measure than did their additive combination. The additional variance explained in all of the variables ranged from 19 to 28 percent. However, the less rigorous test of significant differences among unit-shift combinations, regardless of differences among hospitals (column 5), showed significant differences for all of the variables. Thus, limited evidence supports the second hypothesis, that some work attitudes and perceptions tend to be particularly favorable or unfavorable in particular shifts of particular hospitals, but not in one kind of shift in general. However, the relatively low statistical power of analyses that use a large number of predictor categories relative to number of respondents limits the conclusiveness of the nonsignificant findings. The third, null, hypothesis—that there are no

TABLE 1
Variance Explained by Hospital, Shift, and Their Combinations

Composite Measure	N	Hospital R ²	Shift R ²	All Combinations		
				Additive Combination R ²	η^2	No. of Categories
Doctor-nurse relations	240	.24**	.00	.24**	.45**	85
Role integration	224	.27**	.00	.28**	.47*	83
Intergroup tension	237	.22**	.00	.22**	.46**	84
Nurse satisfaction	243	.13	.02	.15	.43*	85

*p < .05

**p < .01

Increment
 $\eta^2 - R^2$

.21
.19
.24
.28*

regular differences in work attitudes among hospital-shift combinations—cannot be unambiguously rejected for most of the variables studied, especially those for which there were significant differences among emergency units.

DISCUSSION

The results support the basic conclusion that attitudes and perceived work characteristics differ much more among emergency units than among shifts. This conclusion has important implications for both research and improvement efforts that identify and try to interpret attitudinal differences among shifts in a single organization. The lack of substantial differences among emergency unit shifts in any of the attitudinal and perceptual variables studied implies that when researchers, consultants, or administrators find differences among shifts in a single organization, they should not immediately interpret them in terms of time of day, personal characteristics of people who like to work on different shifts, or the relationship of people working odd shifts to the mainstream of society. Instead, investigators should also consider interpretations focusing on characteristics of the particular work and social system of a particular shift in a particular organization. Work-characteristic variables, such as differences in patient composition or workload, that seem to affect one shift at a particular hospital differently than other shifts should be considered. Particular managerial or leadership practices, norms about the desirability of particular shifts, or social characteristics of particular shifts in particular departments are also potential explanatory variables.

Dunham's (1977) review indicated that people who work on shifts other than regular day shifts typically experience various physical health problems. However, he also indicated that a few studies of attitudinal differences among shifts have suggested that differences tend not to appear when shift work is the norm rather than the exception. It is possible that nurses working on shifts other than day shifts form a substantial social community. To the extent that such an informal subsystem develops, it may minimize some of the difficulties in social integration that shift assignments can present.

Any hypothesis concerning probable implications for other settings inside and outside of health care organizations should take the present study's setting into account. On the one hand, given the relative lack of interdependence among different emergency-unit shifts, the opportunity for substantial differences to arise among them is quite significant. In units where continuity of patient care means a progression from one shift to another on the same unit, rather than from one unit to another, shifts are likely to be even more similar than they are in emergency units. On the other hand, the influx of patients into an emergency unit throughout the day and night may make work levels more comparable among all shifts in emergency units than among many other hospital departments. Still, the results do encourage caution in any interpretation of intershift differences found in a single-organization study.

Differences among shifts that pervade an entire hospital rather than a single unit would be difficult to explain on the basis of workgroup-level

variables; they require explanation in terms of administrative policy selectively affecting different shifts. A comparative study covering several hospitals would be quite useful to determine whether or not shift differences are likely to be consistently found for hospitals as whole entities.

More generally, this study points out the value of comparative organizational research focusing on specific hospital departments, not just on hospitals as entities. Research is less likely to report an absence of intershift differences in a particular hospital than their presence. Studying a set of emergency units reduces the effects of systematic reporting biases that might give the illusion of intershift differences. Similar comparative studies of other hospital departments would be useful for developing an understanding of departmental contingencies affecting intershift differences as well as other organizational variables.

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AN EMPIRICAL EXAMINATION OF THE PARSIMONY OF PERCEPTUAL CONGRUENCE SCORES

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A growing body of research deals with congruence and incongruence between supervisors' and subordinates' perception and subsequent effects on outcome variables for organizations and individuals. The results of these studies have indicated positive relationships between congruence and (1) supervisors' evaluations of subordinates (Green, 1972; Miles, 1964;

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Wexley, Alexander, Greenwalt, & Couch, 1980); (2) subordinates' satisfaction and morale (Brown & Neitzel, 1952; Greene, 1972; Wexley et al., 1980); (3) subordinates' liking for supervisors (Triandis, 1959); (4) quality of relationships between supervisors and subordinates (Graen & Schieman, 1978); and (5) subordinates' satisfaction with communication (Hatfield & Huseman, 1982).

When computing congruence scores, researchers have used several techniques. The most commonly used technique, the *D* statistic, derives from simple differences in raw scores for supervisors' and subordinates' perceptions of scale items (e.g., Cronbach & Gleser, 1953). But the question raised by Johns (1981) about the parsimony of such difference scores is an important issue for such research. To state the problem more specifically, when a congruence relationship appears with variables of interest, has that relationship been created by one of the components of the congruence score, or is it actually due to congruence? There is some evidence that component scores contain enough information to render difference scores redundant and unparsimonious (cf. Hatfield & Huseman, 1982; Wexley et al., 1980). The purpose of this study is to examine a relationship between congruence and communication satisfaction to determine if it is primarily a function of congruence, or of one or the other of the components of congruence. This study does not seek to replicate earlier perceptual congruence research, but rather to investigate the parsimony of *D* statistics in the context of a perceptual congruence study.

METHODS

Congruence Components

The Job Problems Index (JPI) was used to measure perceptual congruence between supervisors and subordinates. This instrument, which measures the relative importance individuals place on various job-related problems, has 38 items grouped into three problem categories: (1) administration and supervision, dealing with discipline, morale, and so forth; (2) technical, dealing with quality, production standards, and the like; and (3) coordination and communication, dealing with upward and downward communication, and other such matters.

These categories were developed with an unstructured Q-sort (Kerlinger, 1964; Wittenborn, 1961). We gave 55 first-line supervisors in two, southeastern textile manufacturing plants an open-ended questionnaire that asked them to describe five of their most important job-related problems. We grouped the 50 responses we received into three major problem categories by Q-sort.

Three additional researchers from a southeastern university sorted the problem statements into categories to estimate interrater reliability of our sorting technique. Categorization was 88 percent consistent between these two sortings. Subsequent factor analyses supported the JPI categories.

Test-retest estimates of reliability (one week, $n = 10$) of the JPI from first-line supervisors were all significant at $p < .01$ ($r = .85$, administration and supervision; $r = .95$, technical; $r = .82$, communication and coordination).

Perceptual Congruence

The degree of congruence between the perceptions of subordinates and their immediate supervisors was calculated with the D statistic (cf. Hatfield & Huseman, 1982; Wexley et al., 1980). A generalized distance measure, D is the square root of the sum of squared absolute differences on scale items. For each of the three JPI scales, the lower the D score, the greater was the congruence between subordinates and supervisors about individual subordinates' job problems.

Communication Satisfaction

Communication satisfaction was measured by an instrument developed by Downs and Hazen (1977). We used five of this instrument's eight dimensions of communication satisfaction in this study: (1) satisfaction with communication climate, (2) satisfaction with superiors, (3) satisfaction with organizational integration, (4) satisfaction with organizational perspective, and (5) satisfaction with personal feedback.

Participants and Procedures

First-line supervisors ($n = 161$)¹ and their immediate supervisors ($n = 41$) in five textile plants in the Southeast took the JPI. We instructed first-line supervisors—the subordinates, for purposes of this research—to complete the questionnaire in terms of their perceptions of their own job problems. Their immediate supervisors' responses were to reflect their assessments of the degree to which given subordinates experienced certain job problems. These supervisors made independent observations and completed a questionnaire for each of their participating subordinates. In addition, we administered the Downs and Hazen (1977) Communication Satisfaction Questionnaire to the subordinates.

RESULTS

To test the basic relationships between perceptual congruence and communication satisfaction, we computed partial order correlations between the perceptual congruence and communication variables, controlling for supervisor with dummy variables. As Table 1 shows, there were significant positive relationships between perceptual congruence and subordinate communication satisfaction for each set of analyses. These results are consistent with those of earlier studies of perceptual congruence.

The parsimony of analysis of congruence scores in relation to their components was then examined. We regressed communication satisfaction first upon the two components of the congruence scores, subordinates' and

¹Missing data reduced the usable n , with listwise deletion, to 150.

TABLE 1
Partial Correlations between Congruence Scores
and Communication Satisfaction, Controlling for Supervisor^a

Job Problems	Communication Satisfaction ^b				
	Corporate Perspective	Personal Feedback	Organizational Integration	Relations w/Supervisor	Communication Climate
Administrative	.10	.25**	.19*	.28***	.18*
Technical	.05	.03	.06	.13	.07
Communication	.31***	.28***	.29***	.33***	.25***

^an = 150, residual df = 109; dummy variables were used to control for supervisor.

^bThe signs of the partial correlations reflect the relation between degree of congruence and satisfaction.

*p < .05

**p < .01

***p < .001

superiors' perceptions, and next upon actual congruence scores. An increase in the explained variance resulting from adding congruence scores to the analysis provided an estimate of the net contribution congruence made when one component was controlled. We blocked possible effects of supervisors' responding for several subordinates by using dummy variables for supervisor in the first stage of the regression analysis, thus permitting analysis of all subordinates' responses.

Table 2 presents the incremental R^2 s for the analyses just described. A comparison of Tables 1 and 2 indicates that, in all but one case, subordinates' perceptions contained the same information as the congruence scores. Such a comparison also reveals that, in all but two cases, supervisors' perceptions did not contain the same information as the congruence scores.

Since there were approximately four times as many subordinates as supervisors in this study, and since supervisors' response sets may have contained data of limited variability, in spite of the instructions to make independent observations for each subordinate, it was possible that these results were a function of the way the data were gathered. To test that rival hypothesis, we conducted similar analyses for 41 dyads created by matching one randomly selected subordinate to each supervisor. The results of these analyses were consistent with the results using all subordinates.

CONCLUSIONS

This study examined parsimony of perceptual congruence scores. Specifically, we examined correlations between congruence and communication satisfaction while controlling for one component of congruence to determine whether or not congruence scores contributed information not available in their components.

These results showed clearly that one component—subordinates' congruence scores, containing their own perceptions of their job problems—carried

TABLE 2
Incremental R^2 for Congruence Scores, Controlling
for Congruence Score Components^a

Job Problems	Communication Satisfaction				
	Corporate Perspective	Personal Feedback	Organizational Integration	Relations w/Supervisor	Communication Climate
(a) Controlling for Subordinate Perceptions					
Administrative	.002	.014	.008	.013	.009
Technical	.008	.001	.000	.002	.011
Communication	.022*	.003	.006	.010	.004
(b) Controlling for Supervisor Perceptions					
Administrative	.004	.031*	.023*	.030*	.020
Technical	.001	.000	.001	.003	.004
Communication	.046*	.025*	.032*	.027*	.015

^an = 150, residual df = 108; all analyses also control for supervisor using dummy variables.

* $p < .05$

the relationship between congruence and communication satisfaction. This finding is similar to those of Hatfield and Huseman (1982) and of Wexley and colleagues (1980).

In addition, incremental R^2 s for the congruence scores controlled for congruence score components. More specifically, we calculated incremental R^2 s that controlled for subordinates' and supervisors' perceptions. Comparing the partialling and multiple regression analyses indicated that supervisors' perceptions did not contain the same information as the congruence scores.

Future studies examining relationships between perceptual congruence and outcome variables should use partialling or regression techniques to ensure that congruence and outcome variable correlations are not functions of the components of congruence scores rather than of congruence itself. This and other studies have shown that subordinates' perceptions can dominate in those relationships.

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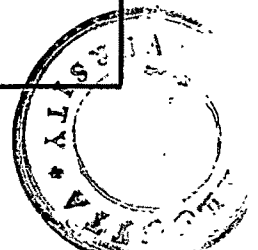
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FROM THE EDITOR

During our meeting in San Diego, members of the Editorial Board expressed concern that some articles we receive are in such a preliminary stage of development that it is impossible for us to judge the true worth of ideas and research presented. The current number of submissions is much too large for us to be able to justify going through the many revisions necessary to bring such articles to a level suitable for publication. The board therefore asked me to advise authors that they should take the time and effort necessary to polish papers before submitting them, and use their colleagues as critical readers to help them to detect weaknesses and areas in need of clarification.

Unfortunately, some junior scholars get quite different advice. A Ph.D. student in one of the doctoral consortia asked me whether I agreed with a faculty member who advised him to go ahead and submit an article before polishing it because he would undoubtedly have to revise it anyway, and he might as well see the reviewers' comments first. I told him I did not agree. After seeing a year's worth of submissions, I have quite different advice to offer: No article should be submitted that has not gone through at least three complete rewrites, and for all but the most facile writers among us, five rewrites is a better rule of thumb. New authors, in particular, should circulate their papers to several published scholars for comments and then revise carefully to deal with the comments they receive. In effect, authors should use their colleagues as informal reviewers before submitting anything to the formal review process. Seasoned authors do this, and it is one reason they are successful in achieving publication. Because journal space and reviewer time are scarce resources, only papers that are clearly written and convincingly argued are likely to survive the initial review process. Also, articles written for the particular journal to which they are submitted stand a much better chance. Prospective authors should consult recent issues to discern the topics of interest, the usual structure and format of articles, the general writing style, and the level of argument expected. To do less is not only inconsiderate of reviewers' and editors' time, it is also likely to be self-defeating.

This issue of *AMJ* not only marks the end of my first year as editor, but also the completion of my plans to appoint three Consulting Editors. I am pleased and grateful to have the help and advice of Rick Mowday, Manny London, and Carl Zeithaml. Many of you have already profited from their perceptive, careful, and helpful comments on papers you submitted to us; all *AMJ* readers will share in the improvements their efforts make possible.

The composition of the Editorial Board has changed over the year and I expect it to continue to change; some members had to leave because of other pressing commitments; new members have been added as I have identified outstanding reviewers in areas in which we need more help. All deserve my and your thanks for the care they have given to maintain high standards with

grace and lots of constructive suggestions. In addition, a large number of individuals, listed elsewhere in this issue, have provided us with excellent and usually prompt ad hoc reviews—many of them several times. They also deserve thanks and a formal acknowledgment of their important professional service.

Finally, I want to again thank and formally acknowledge the outstanding efforts of Tom Mahoney, whose editorship provided all of the excellent articles that *AMJ* has published this year. The next issue will mark the beginning of publication of articles accepted under my editorship.

With this issue, *AMJ* also inaugurates a new service to readers: a detailed subject index to the articles published over the last year. Nancy Dodd has done a superb job of distilling a pertinent set of subject headings from the published articles and other sources. She and I are interested in your reactions and suggestions as to how to improve the index in future years, and we hope you find this innovation useful.

The following statistics reflect the status on September 18 of all manuscripts submitted between July 15, 1984 and September 17, 1985:

1984		1985	
Manuscripts submitted	248	Manuscripts submitted	329
Under initial review	0 (0.0%)	Under initial review	63 (19.1%)
Rejected without review	22 (8.9%)	Rejected without review	34 (10.3%)
Rejected after review	170 (68.5%)	Rejected after review	160 (48.6%)
Under revision	33 (13.3%)	Under revision	71 (21.6%)
Accepted	23 (9.3%)	Accepted	1 (0.0%)

If we consider only articles for which a final decision has been made (leaving out of the calculation those still under revision), the proportion of articles accepted is 11.9 percent. This proportion will probably increase somewhat in the future as articles still under revision are accepted. Articles that will eventually be accepted for 1985 are still under revision, which category includes those in the review process following revision.

Data on the turnaround time (in days) from initial submission to first decision letter follow:

	1984				1985			
	N	Median	Mean	s.d.	N	Median	Mean	s.d.
Rejected	160	55	62.3	28.1	148	56	62.1	27.4
Revisions	69	69	78.9	35.3	69	71	76.9	27.6
Overall	229	59	67.3	31.3	217	61	66.8	28.2

Articles rejected without review have been excluded from these data so that they accurately reflect the time elapsed in our initial review process. (The usual turnaround on rejects without review is 3-4 days.) Turnaround time for articles on which we request revisions is somewhat longer because these manuscripts sometimes are sent to a third reviewer when the first two reviewers disagree, and because it takes extra time to prepare careful, detailed letters to guide revisions. We are trying very hard to make a final decision on the first revision and probably succeed in doing so for more than half of the revised manuscripts submitted.

J.M.B.

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ORGANIZATIONAL PERFORMANCE AS AN ANTECEDENT OF INSIDE/OUTSIDE CHIEF EXECUTIVE SUCCESSION: AN EMPIRICAL ASSESSMENT

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This study assessed the conventional formula that poorly performing companies are more likely to replace chief executive officers (CEOs) with outside, rather than inside, successors. An examination of all New York Stock Exchange companies experiencing CEO succession over one year strongly indicated nonlinear relationships between multiple indices of organizational performance and choice of successor types. As expected, companies with reasonable performance prior to succession did not opt for outside successors. Poorly performing companies, however, did not choose outsiders either. Only companies with midrange performance chose outside succession.

Organizational strategy, structure, environment, performance, and their interactions are all central to organizational studies at the policy level. Presumably, agents within organizations act on these factors and react to them. The exact manner in which organizations should be configured and manage these factors remains controversial. Even so, theorists (Brady & Helmich, 1984; Glover, 1976; Hofer, 1980; Steiner, 1979; Steiner, Miner, & Gray, 1982) have largely agreed that chief executive officers (CEOs) are the individuals responsible and accountable for these actions or reactions. In most organizations, the central concept of the business seems to originate with the CEO (Lauenstein, 1980).

Major financial periodicals including *Business Week*, *Financial World*, *Forbes*, *Fortune*, and the *Wall Street Journal* seem to share this view, which may be presumptive evidence that practitioners and analysts attribute direction and ultimate responsibility to CEOs as well. The so-called CEO Factor (*Financial World*, 1981) may underscore such a presumption. Basically, this concept suggests that CEOs have significant effects on investors' perceptions that in turn affect the price and future fluctuations of their companies' common stock. Concern with this factor is basic to investors and analysts alike. *Business Week* (1982) reported, for example, that industry analysts actually removed Evans Products from their buy lists when they learned that there

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was no successor in line to replace the firm's current CEO. In another case, *Business Week* (1983b) suggested that the lack of a clear successor had a highly negative impact on the financial performance of Fairchild Industries. Most recently, *Fortune* (1984) reported that some Wall Street analysts dropped their buy recommendations for Allied Corporation as a reaction to the alleged lack of a clear executive succession in that company.

Given this record, it is surprising that the role of the CEO has been "noticeably absent" from the organizational literature (Leontiades, 1980: 157). In fact, executive processes in general and specifically the roles of CEOs have received an "astonishing lack of attention" (Pfeffer & Salancik, 1978: 253). More recently, Brady and Helmich noted that the "dearth of systematic studies devoted to the subject is puzzling" (1984: 2).

This is especially notable in the area of CEO succession. Successions at this level are not rare events. In fact, a recent report on 1000 leading industrials and 300 major service organizations indicated that 45 percent of current CEOs had held their positions for five years or less (Heidrick & Struggles, Inc., 1980). A recent cover report on CEO succession referred to the phenomenon of increasing CEO turnover as a "revolving door" (*Business Week*, 1983c: 104). When such successions do occur, choices of successor types—insiders or outsiders—are decisions critical to the subsequent performance of firms.

Investigations of the issue of successor type (Brady et al., 1982; Caplow, 1976; Carlson, 1961, 1962; Helmich, 1974, 1975, 1976a, 1976b; Helmich & Brown, 1972; Mace, 1977; Pfeffer, 1972; Salancik & Pfeffer, 1980) seem to reflect a common theme. They generally conclude that replacement of chief executives from within the organization represents a maintenance strategy. Outside successions, on the other hand, have often been associated with change (Brady & Helmich, 1984; Guest, 1962; Helmich, 1974, 1976b; Helmich & Brown, 1972; Lewin & Wolf, 1974; Pfeffer, 1981).

Choices of outside replacements are especially crucial in the face of poor organizational performance (Bibeault, 1982; Helmich, 1976a; Hughes, 1982; Kudla, 1976; Lewin & Wolf, 1974; Hofer, 1980; Schendel, Patton, & Riggs, 1976; Starbuck & Hedberg, 1977). Some authors have argued that outside succession is an essential ingredient of turnaround strategies. Starbuck and Hedberg, for example, contended that "top management as a group must be replaced" for a turnaround attempt to succeed (1977: 256). Similarly, Hofer argued that "a precondition for almost all successful turnarounds is the replacement of the current top management" (1980: 25-26).

These views of inside or outside succession present a persuasive logic with respect to firms' past performances. Theorists and analysts insist that executive replacement is often a response to sagging profitability. According to this view, changing chief executives represents an effort to improve organizational performance (Allen, Panian, & Lotz, 1979; Brown, 1982; James & Soref, 1981; McEachern, 1975; Pfeffer & Leblebici, 1973). Given that poor performance may be an antecedent of CEO replacement, it follows that poorly performing companies should opt for outside, not inside, succession.

This basic formula is appealing. Poorly performing companies may well choose outside successors to institute change; organizations with acceptable or better performance may be inclined instead to choose insiders who presumably will adopt maintenance strategies. Although the literature clearly underscores the viability of this formula, there is an opposing view. That is, there are several factors that may attenuate such tendencies to select outside CEOs.

Ideally, those responsible for selecting CEO replacements—boards of directors—would consider organizational needs and candidates' qualifications and choose accordingly. There are those, however, who have argued that this representation of the process may be somewhat simplistic (Dalton & Kesner, 1983; Pfeffer & Salancik, 1978).

Pfeffer and Salancik, for example, view administrative succession "as a political process of contested capability, where the contest is resolved by subunit power" (1978: 237). Such a process may attenuate the relationship between context and inside versus outside CEO succession. Although company performance may strongly indicate a need for change in the form of an outsider, powerful constituencies may have both the inclination and where-withal to select an insider with a maintenance charter. Outside successions have been associated with changes in existing patterns of administrative and resource allocations (Guest, 1962; Helmich, 1974, 1975; Helmich & Brown, 1972; Lewin & Wolf, 1974; Pfeffer, 1981.) It may be that established executives and other interested parties would be understandably reticent to allow or endorse such redistributions. Simply stated, powerful constituencies entrenched in organizations as currently configured may well encourage, if not demand, inside succession.

In addition to these political concerns, there may be a general reluctance for organizations to opt for outside succession. Drucker, for example, somewhat harshly observed: "It is an admission of bankruptcy for a big business to have to go on the outside to recruit into top management. It is also a desperate gamble" (1974: 662). Others, although less emphatic, agreed that outside successions are risky at best, and disruptive (Allen et al., 1979; Helmich, 1976a; Mace, 1977). This reluctance may be partly a function of self-interest in those actually charged with replacing CEOs. Presumably, some of these individuals—high ranking corporate officers, board members—could be reasonably considered as candidates for the job themselves; adhering to a philosophy of inside promotion may enhance their careers. Dalton and Kesner (1983) also demonstrated that a number of factors related to organizational size may attenuate the logic that equates outside successors with change and insider successors with maintenance.

Moreover, the apparently simple and often suggested account of succession that links poor performance and outside replacements may actually rest on two arguably unmet assumptions. First is the assumption that outside successors can change policies or embark on major organizational transitions. This ability is less than obvious. The sheer numbers of persons involved, the complexities of organizations, and the many vested interests both inside and

outside companies can constrain the potential for successful change strategies (Dalton & Kesner, 1983). Firms may consider outsiders both when changes are indicated and when changes appear to be attainable. Doubts about the efficacy of change strategies may reduce the incidence of outside succession.

A second constraint on choosing outsiders may be more serious. This account of succession necessarily assumes that acceptable successors are available. Trow noted in a different context that there may be some reluctance "to volunteer for command of an already failing organization" (1961:223). This is a central point. Organizations that are performing very poorly may have some difficulty recruiting acceptable outside successors. Certainly, some successor could always be found; however, viable outside successors whose reputations suggest subsequent improvements in firms' performances may be scarce. Quality candidates with proven track records may be unwilling to take over "hopeless" companies. To head a company with a history of undistinguished performance over a number of years may be a challenge, but a pattern of outrageously poor performance promises to resist improvement and to tarnish nearly anyone's reputation.

A final consideration may imply that poorly performing companies will not normally go outside for executive replacements. Boards of directors are chartered to select chief executive officers. If organizations are performing very poorly, turnaround strategies may be indicated. Given that viable turnaround strategies often demand replacing top corporate officers (Bibeault, 1982; Hofer, 1980; Starbuck & Hedberg, 1977), inside directors who are top officers might actually jeopardize their own jobs by endorsing outsiders. They are the very individuals most likely to be unseated in turnarounds precipitated by outside successors.

These factors do not necessarily refute the account of succession in which poor performance and choosing outsiders correspond. They may, however, weaken such a relationship. Or many of these factors might individually or in combination act to minimize the incidence of outside succession, even when radical changes are indicated. Still, the suggestion that organizations choose outside successors, at least in cases of very poor performance, led to the hypothesis of interest:

Hypothesis 1: A choice of an outside chief executive officer will be associated with poor organizational performance in the period prior to the succession.

The examination of this hypothesis depends in part on what constitutes organizational performance. The following section includes an overview of this construct and a justification of its measurements in this research.

Organizational Performance

The literature has strongly endorsed relying on multiple performance indicators (Cochran & Wood, 1984; Hall, 1982; Steers, 1977). Although "the number of corporate performance measures that could serve as dependent variables is almost infinite" (Weiner & Mahoney, 1981: 456), we selected two representative measures that were consistent with the objectives of this

research. Cochran and Wood (1984) argued that although there is no consensus as to what constitutes the proper measure of financial performance, such measures fall into two broad categories: investor returns and accounting returns. Accordingly, we selected (1) an investor return, a metric derived from end-of-the-month closing stock prices for the three years prior to succession, and (2) an accounting return, average return on equity (ROE) for the same period.

Relying on ROE and prices of common stock seemed appropriate in this case inasmuch as analysts and prior research have frequently used such indicators (Alexander & Buchholz, 1978; Asquith, 1983; Asquith & Kim, 1982; Fulmer & Rue, 1974; Jensen & Ruback, 1983; Karger & Malik, 1975; Kudla, 1980; Linn & McConnell, 1983; Masulis, 1980; Thune & House, 1970; Vance, 1975; Weiner & Mahoney, 1981). Moreover, both are consistent with the primary thrust of this examination. As we noted earlier, investors, analysts, and practitioners alike attribute corporate direction and ultimate responsibility to CEOs. This CEO factor (*Financial World*, 1981) affects investor perceptions that in turn affect prices and fluctuations of companies' common stock. ROE (income before extraordinary expenses and discontinued operations/common equity as reported), then, is a suitable measure since this inquiry concerned patterns of returns on common equity as antecedents of executive succession.

A metric based on end-of-month common stock prices also addresses the effects of executive succession on shareholders (Branch & Gale, 1983; *Business Week*, 1983a; Rappaport, 1983a, 1983b). Management attention to market prices of common stocks, however, extends well beyond interest in stockholder welfare. Weiner and Mahoney, for example, argued that "stock prices influence the ability of corporate management to raise capital from equity markets and thus represent a significant goal of corporations" (1981: 456). Also, the price of its common stock, particularly if the stock is seen as undervalued, is a major predictor of whether a firm will become a target of a hostile takeover bid (Lofthouse, 1984; Silverman, 1984). Indeed, Manne (1965) suggested that outside successions may actually amount to mini-takeovers, corporate boards' last efforts to avoid unfriendly takeover attempts by other firms. Finally, Manne also noted that "apart from the stock market, we have no objective standard of managerial efficiency" (1965:113).

METHODS AND ANALYSIS

Sample

The sample ($N=96$) is composed of all companies on the New York Stock Exchange reported to have experienced executive succession in a one year period. This information was derived from daily reports of these activities in the *Wall Street Journal* and was confirmed by corporate 8K reports. We considered only CEO successions in parent companies, excluding successions involving subsidiary companies due to their lack of independence.

Variables

CEO succession is binary since any replacement must be either an insider or an outsider. Inside successors are promoted from within the executive spans of their predecessors; outside successions occur when newly appointed CEOs were not in their predecessors' spans (Helmich, 1974, 1975, 1976a, 1976b).

Return on equity. ROE data were collected from Compustat reports on the 96 subject companies for the three years prior to the successions. Specifically, ROE here is income before extraordinary expenses and discontinued operations divided by common equity as reported. We simply combined these data to create a continuous variable: average ROE for the presuccession period. We could then conduct a logit analysis between this metric and the binary inside or outside succession variable.

Common stock performance. These data were collected from the University of Chicago's Center for Research in Securities (CRSP) monthly files. For each subject company, end-of-the-month closing stock prices for three years prior to successions provided a vector of 36 data points. We then subjected each of these vectors for the sample companies to a regression analysis to determine the slopes of the standardized regression equations. Obviously, if this slope was negative, organizational performance had been falling over the three year period; correspondingly, a positive slope indicated rising performance. Once we had determined the slopes of the regression equations for the common stock plots, we used these values as continuous variables. This, of course, created a vector of data points equal to the number of companies in the succession sample. To test the hypothesis, then, we simply subjected this continuous variable to a logit analysis with a dummy (0 = inside; 1 = outside) variable derived from the inside or outside succession dichotomy.

For both the ROE and common stock price metrics, reliance on a three-year period to assess organizational performance provided two fundamental benefits. First, organizations do not normally react to poor performance in the short run by replacing their CEOs. Rather, patterns of falling performance over longer periods are more likely to precede replacement decisions.

A second benefit of using the three-year period for the monthly common stock data was that it provided 36 data points for analysis. This dimension was crucial in determining what constituted "poor" performance. In some cases, periods longer than three years would be desirable for analytical purposes. Unfortunately, with the power of longer periods comes a fatal confound: multiple successions, changing CEOs more than once in an examination period. It seems reasonable that multiple successions would have profound and unacceptable effects on both the dependent and independent variables. The three year period, then, allowed sufficient data points for responsible analysis and provided sample selection parameters that insured a reasonable sample size.

RESULTS

Although inside executive succession was certainly the rule for this sample of New York Stock Exchange companies, outside succession was not

uncommon. The incidence of outside succession was 16 percent; of inside succession, 84 percent. The analytical question, however, was whether the incidence of inside versus outside succession in a given year was systematically related to firms' performance levels in prior years. Given the dichotomous dependent variable and the nature of its distribution,¹ we conducted a logit analysis (1) between the inside or outside succession variable and ROE and (2) between inside or outside succession and common stock performance. There was virtually no support for our hypothesis for either performance indicator. Prior poor performance evidently did not lead to outside succession. Additional analyses of these data, however, demonstrated a robust relationship. Figure 1 illustrates strong nonlinear associations between inside or outside succession and performance in terms of both ROE and common stock prices.

This figure shows two scatterplots of the incidence of inside and outside executive succession by organizational performance. In Figure 1a, for example, common stock performance ranges from an extremely poor $-.93$ to an excellent $.56$. Interestingly, there were no outside successions at the extremes of this distribution; outside successions occurred only in the midrange.

Figure 1b illustrates a similar result. Although there was a wide range in average ROE for the three-year period prior to succession, outside successions, with a single exception, occurred in the midrange. Inside successions characterized both the low and high ROE extremes of the distribution.

The results for both performance metrics seemed to indicate that outside successions appear only in the midrange. Inside successions, on the other hand, are largely restricted to the extremes of the distributions. The statistical analysis of these results, however, depends on what constitutes the extremes of the distribution. For example, should the highest performing 1 percent and lowest performing 1 percent of the companies constitute these extremes? Or perhaps it should be the top and bottom 5 percent or 25 percent. The choice of parameter will greatly affect any statistical analysis that demonstrates differences between extremes and midrange. Selection of only modest percentages, such as 1-3 percent, of high and low values is hardly conservative since it relies on outlying values.

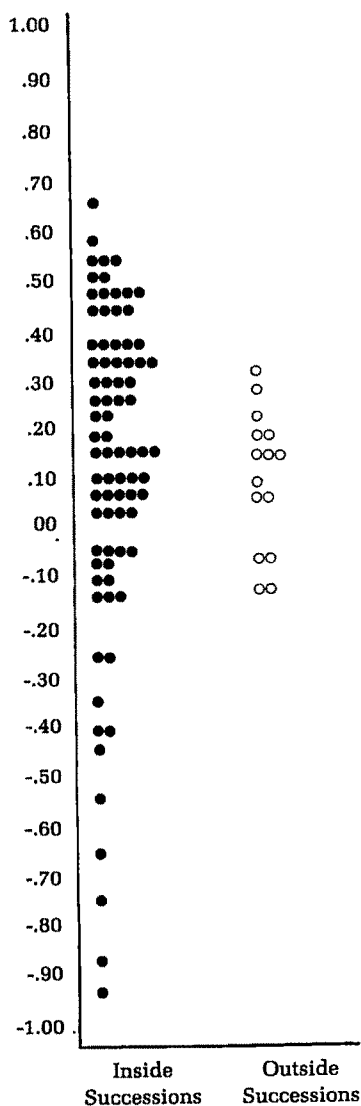
By partitioning the cases at several reasonable levels, however, we could demonstrate that the incidence of outside succession was nonlinearly and significantly related to prior organizational performance, as Tables 1 and 2 illustrate.

A contingency analysis for the common stock performance metric (Table 1) relying on 15 percent partitioning demonstrated that the incidence of outside succession at the extremes was substantially and significantly different. No outside successions occurred in the top and bottom 15 percent of the cases, but in the midrange outside succession occurred in 22.7 percent of the

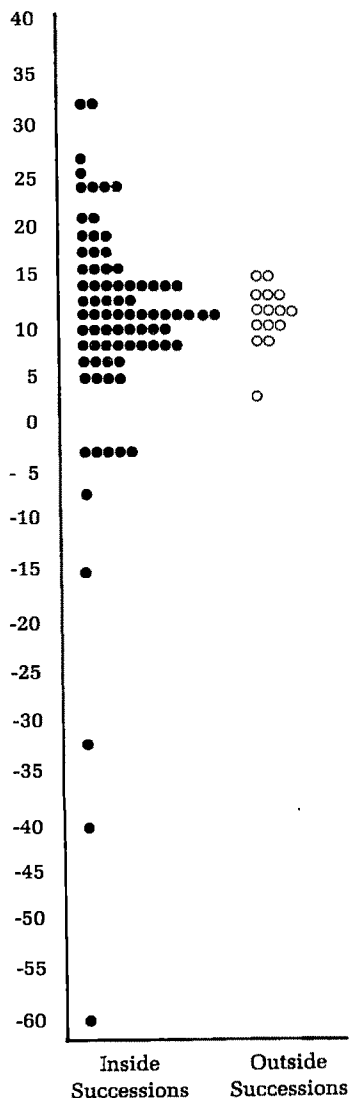
¹ Means and standard deviations of variables: Inside/outside succession (.84; .37), end-of-month closing stock prices (.02; .03), return on equity (10.22; 12.37).

FIGURE 1
Plots of Organizational Performance Metrics
and Inside or Outside CEO Succession

(a) Closing Common Stock Prices and Succession



(b) Return on Equity and Succession^a



^a One case was not included here as it was greatly out-of-range. The company's ROE for the three years prior to succession was a remarkable 1223.40. This case is of little consequence to the findings, as it was an inside succession.

TABLE 1
Contingency Analyses with End-of-the-Month Closing Common
Stock Prices and Inside/Outside Succession

	Outside Succession (%)	Inside Succession (%)
(a) Results of 15% partitioning**		
Top	0.0	100.0
Midrange	22.7	77.3
Bottom	0.0	100.0
(b) Results of 20% partitioning**		
Top	0.0	100.0
Midrange	24.1	75.9
Bottom	5.3	94.7
(c) Results of 33% partitioning*		
Top	6.3	93.6
Midrange	25.0	75.0
Bottom	15.6	84.4

* $p < .10$ ** $p < .05$

TABLE 2
Contingency Analyses with Return on Equity and Inside/Outside Succession

	Outside Succession (%)	Inside Succession (%)
(a) Results of 15% partitioning*		
Top	0.0	100.0
Midrange	21.2	78.8
Bottom	6.7	93.3
(b) Results of 20% partitioning*		
Top	0.0	100.0
Midrange	25.0	75.0
Bottom	5.0	95.0
(c) Results of 33% partitioning**		
Top	9.4	90.6
Midrange	31.3	68.7
Bottom	6.3	93.7

* $p < .05$ ** $p < .01$

cases ($p < .05$). Partitioning by 20 percent also resulted in substantive and statistically significant differences: no outside succession in the top 20 percent of companies; 5.3 percent for the bottom 20 percent; and 24.1 percent of outside succession in the midrange ($p < .05$). In fact, although it is difficult to argue that partitioning cases into equal segments identifies extremes, it can nonetheless be shown that outside succession was unequally distributed

and marginally significant. Outside succession occurred in 15.6 percent of the bottom third of companies; in 6.3 percent of the top third; and in 25.0 percent of the midrange firms in this sample of New York Stock Exchange companies ($p < .10$).

The results were similar for the ROE metric (Table 2). Regardless of the partitioning adopted (15%, 20%, or 33%), the results indicated a statistically significant, nonlinear relationship between ROE and inside or outside succession.

DISCUSSION

The replacement of CEOs, whether in public or private organizations, has major influences on areas of those organizations. These areas may include origination of goals and allocation of organizational resources (Lorange, 1980), interorganizational exchange of information (Helmich, 1977), and managing interdependence with environments (Helmich, 1977; Pfeffer & Salancik, 1978).

It has been posited that the range and choices of strategies for accomplishing these and other ends is partly a function of whether CEOs are from inside or outside organizations. A popularly held view is that organizations seeking change should generally opt for outside successors. Organizations interested in maintenance should be correspondingly likely to choose inside succession. This formula is, of course, fundamental to strategies that might be employed to improve organizational performance, particularly in poorly performing firms. The results of this examination demonstrated a strong relationship between prior organizational performance and successor choices. The association, however, was somewhat more complex than those most often suggested. According to the logic linking outsiders with change, and insiders with maintenance, poorly performing firms should be inclined to choose outside successors. The results of this investigation provided no support for this proposition. Rather, the relationship between inside or outside executive succession and prior performance was distinctly nonlinear.

It can be demonstrated with a variety of partitioning parameters that outside successions are relatively rare in both poorly performing organizations and those with relatively good performance. These results were invariant across two metrics of organizational performance. Although inside successions occurred at all points in the distribution of performance, outside successions appeared nearly exclusively in the midrange. The results for the top end of the performance ranges were not surprising. Firms would not be reasonably expected to opt for outside succession when performance has been good to excellent. The almost total absence of outside successions at the downside extremes, however, was something of a departure from expectations raised by the extant literature.

We have previously noted a number of possible practical and political factors that might attenuate the traditionally expected relationships between choice of inside or outside CEOs and prior organizational performance. Although these effects remain speculative, two of them may have some promise for explaining the dynamics of these results.

As Trow (1961) argued, it may be difficult to attract viable candidates to "take the helm" when the past performance of a company has been extremely poor. The viability of turnaround at that point may be suspect. Also, boards of directors—some 40 to 50 percent of which are high-ranking corporate officers—are chartered to select replacement CEOs (Herman, 1981; Mintzberg, 1983; Vance, 1983). Given that viable turnaround strategies often include replacing top officers (Bibeault, 1982; Hofer, 1980; Starbuck & Hedberg, 1977), boards have some reluctance to opt for outside successors. Presumably, the very officers who are most likely to be unseated in turnarounds are those inside managers who serve on boards. It may be that board members who endorse outside succession actually jeopardize their own jobs.

This may also serve as a preliminary explanation of why outside successions appear in the midrange of performance. These situations are not hopeless; these firms may be able to attract outside CEOs since improvement is not an unreasonable expectation. The companies' performances, however, are such that radical turnaround strategies are not indicated. In these cases, top officers and board members who endorse outside succession may not do so at their own peril, since their replacement is not imperative.

Given these data, an argument for a nonlinear relationship between inside or outside succession and prior performance seems responsible. The dynamics that may account for these results, especially for the downside in performance, remain undetermined. It would seem, however, given the alleged effect of CEO replacement, that the antecedents of inside or outside executive replacement and organizational performance would be fruitful areas for future research.

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TOWARD AN EMPIRICAL PRIORITIZATION OF CONTINGENCY VARIABLES FOR BUSINESS STRATEGY

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This study, based on data from the Profit Impact of Market Strategies (PIMS) program, is a preliminary attempt to prioritize contingency variables for the field of business strategy. Chow tests for structural homogeneity shed light on the relative degrees of overall significance of ten widely-cited contingency variables. User sector, consumer or industrial, was the contingency variable that emerged as most potent among those examined. Implications for researchers and executives are suggested.

We have all heard or read variations of the following:

Journal reviewer: "By pooling together businesses in the growth stage of product life cycle with those in the mature stage, the author has no doubt over-aggregated."

Popular business magazine: "Mr. Smith's troubles can be traced to his attempt to apply in the consumer-product sector the strategic formula that worked so well for him in the industrial-product sector."

Business school instructor: "The strategic considerations facing a general manager are very different depending on whether a product is commodity-like or differentiable."

Each of these statements presumes the significance of some contingency variable—life-cycle stage, user sector, and differentiability, respectively. All three statements sound plausible, but none has been put to a sustained, comprehensive test. More critically, even though the contingency view has come to be of central importance for business strategy researchers, no one has prioritized contingency variables according to the relative magnitudes of their overall intervening effects on strategy and performance. That is, contingency variables have never been weighed against each other to determine their relative degrees of overall significance in strategy formulation. This study attempted such an analysis for ten widely cited contingency variables.

The project took a broad, overarching view of the role of contingency variables, and as such was intended to complement projects that will explore in depth the moderating effects of individual contingency variables on the relationships between individual strategic attributes and performance. Some

aims of this study were to stimulate such further explorations, to help in setting their priorities, and to provoke hypotheses for examining individual contingency variables.

The first major section of this paper discusses the contingency perspective and the meaning of the significance of a contingency variable. The second section discusses the ten contingency variables that were examined and presents a scheme for hypothesizing their relative degrees of significance. The third section presents our methodology. The two remaining sections present results and suggest implications for researchers and practicing strategists.

THREE VIEWS OF BUSINESS STRATEGY

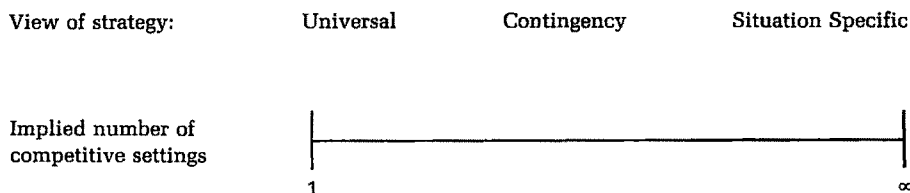
One difficulty in research on business-level strategy is the fact that two identical strategic settings never occur. This problem has given rise to three primary approaches to studying strategy—the situation-specific, universal, and contingency views.

The Extreme Views

The situation-specific view sees strategy as an artful alignment of environmental opportunities and threats, internal strengths and weaknesses, and managerial values (Andrews, 1971; Uytterhoeven, Ackerman, & Rosenblum, 1973). Proponents of this view tend to do case research, since they maintain that analysts can draw no conclusions about firms' strategies unless they understand the firms' unique situations. Some quantitative research also has demonstrated that strategic generalization beyond one or two firms can be risky (e.g., Hatten, Schendel, & Cooper, 1978). On a continuum representing the number of discrete types of competitive settings envisioned by researchers (Figure 1), the situationalists appear at the end labeled infinity.

The second—and quite opposite—view is that universal laws of strategy exist and hold to some extent in all settings. For example, the Boston Consulting Group popularized the "law" of cumulative experience, calling it "almost universally observable" (1980: 1). The Profit Impact of Market Strategies (PIMS) program popularized the "law" of market/share, implying its universal applicability in the statement, "there is no doubt that the relationship can

FIGURE 1
The Number of Competitive Settings Implied
by Various Views of Strategy



be translated into dynamic strategies for all businesses" (Buzzell, Gale, & Sultan, 1975: 102). Given these laws, any business would be well advised to pursue a strategy of aggressively building cumulative experience and market share. Such laws imply that there is only one grand type of competitive setting and one universally sound strategy, as Figure 1 indicates.

The Contingency View

Contingency theories state that the appropriateness of different strategies depends on the competitive settings of businesses. Such theories differ from the universal view by stressing that "it all depends." They differ from the situation-specific view by arguing that there are classes of settings for which strategic generalizations can be made. It would seem that organizational and strategy scholars can make their greatest contributions through the contingency view (Hambrick, 1983a; Hofer, 1975; Pinder & Moore, 1979).

Building a contingency theory requires having a basis on which to divide competitive settings into discrete classes. To start with, what are the relevant contingency variables? In one of the few attempts to address this issue, Hofer (1975) listed variables that he thought should affect choices of strategies. He noted that all combinations of his 54 variables, with each assumed to have only two possible values, would yield 18 quadrillion possible settings—still uncomfortably close to the situation-specific end of the continuum. This problem led him to suggest some priorities. For example, he speculated that the most crucial contingency variable is stage of product life cycle, and he went on to set priorities within each stage of this life cycle. His premises have gone largely untested, although some research has been conducted on strategies for different life-cycle stages (Hamermesh & Silk, 1979; MacMillan, Hambrick, & Day, 1982) and on differing strategies for high-share and low-share businesses (Bloom & Kotler, 1975; MacMillan et al., 1982; Woo & Cooper, 1981). These studies have been instructive, but have skirted the issue of which contingency variables are most significant overall.

In his landmark book integrating concepts from industrial economics and competitive strategy, Porter (1980) similarly identified what he took to be three crucial contingency variables: degree of industry concentration, stage of product life cycle, and exposure to international competition. He described how these factors can affect the appropriateness of different strategies, but made no compelling argument as to why these factors deserve more attention than others.

ON THE SIGNIFICANCE OF INDIVIDUAL CONTINGENCY VARIABLES

The purpose of this project was to assess the relative degrees of significance of several presumably key contingency variables. Thus, some discussion of what we mean by significance is in order. Broadly speaking, a contingency variable is significant to the degree that businesses that differ on that variable also exhibit major differences in how strategic attributes or actions are associated with performance. Clearly, we use the term significance here

in a more general way than it is used in statistical tests. The term seemed more appropriate than the closest alternatives, importance or strength.

Put another way, major differences in the associations between strategic attributes and performance in differing circumstances indicate the presence of a significant contingency variable. For example, assume a sample of businesses were subdivided according to scores on some contingency variable, with L for low scores on the variable, and H for high, as shown in Figure 2. Further assume that analysts examined the relationship between some key strategic attribute and performance for each subsample. If there were no differences between the two subsamples, as in Figure 2a, the analysts could deem the high-low split uninteresting and could discount the significance of the contingency variable on which it was based. Alternatively, major reversals in the relationships, as shown in Figure 2b, or significant differences in the slopes of the relationships (Figure 2c), which would be more likely, would indicate potential significance for the split on that contingency variable.

Here is a tangible illustration of this last possibility. When businesses in the PIMS data base are subdivided into consumer and industrial-product businesses, the relationship between market share and profitability is positive for both subsamples, but is significantly steeper in the statistical sense for the consumer-product class, as judged by the Chow test (Day, MacMillan, & Hambrick, 1983.) Thus, a split between producers of consumer and industrial goods appears to be of some significance. However, the real test of its significance is in whether these differences persist in regressions of several strategic attributes—not just market share—on performance. Moreover, such a test would gain weight if differences arising from the consumer/industrial split were weighed against differences arising from other contingency splits.¹

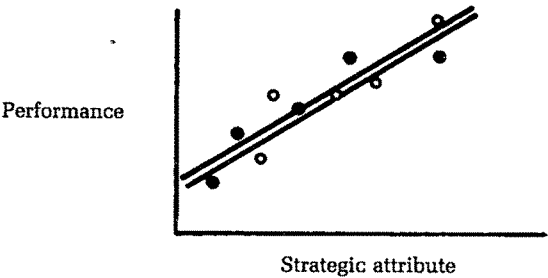
This research involved an assessment of the overall significance of several contingency variables, as judged by the degree to which those variables moderated links between a comprehensive set of strategic attributes and business performance. As such, this project did not address the particular roles of contingency variables in resolving highly focused strategy questions. For example, in an overall test of the significance of various contingency variables, degree of supplier concentration in an industry might not emerge as very significant; however, in a study focused primarily on the effectiveness of various backward integration strategies, supplier concentration would no doubt be a crucial variable (e. g., Harrigan, 1983).

Thus, this study does not purport to be particularly fine-grained. Its hypotheses deal with expected degrees of overall significance of each contingency variable, rather than with the expected significance of each contingency variable in moderating the links between specific strategic attributes and performance. We resisted the second approach for several reasons. First, in order to accomplish our primary goal of beginning to assign priorities to contingency variables, it was necessary to examine many such variables in

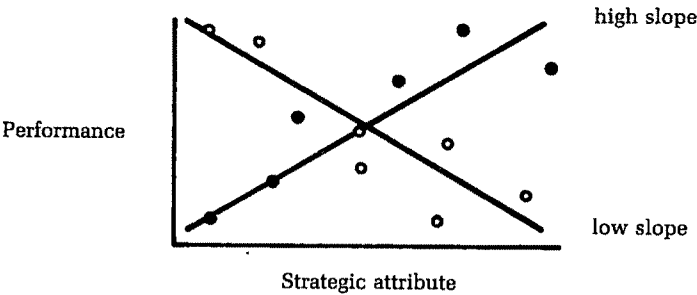
¹ The term split will refer to the division of businesses into two groups according to their scores on a contingency variable.

FIGURE 2
The Contingency Variable as Moderator of Patterns of Dependence:
Some Hypothetical Possibilities

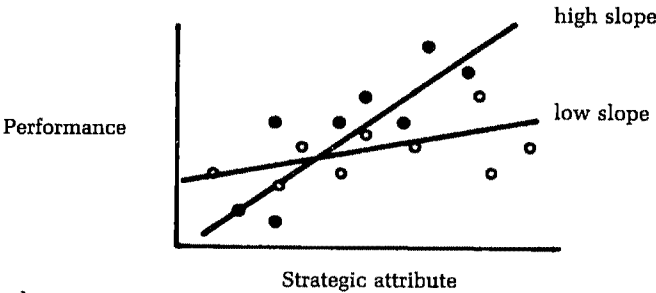
(a) High/low split is uninformative



(b) High/low split very important—major reversal



(c) High/low split important—different slopes



O = low values

● = high values

order to observe any contrasts. This need in turn limited the space available for hypothesizing and discussing individual relationships for specific strategic attributes. Moreover, hypotheses about individual relationships under most of the contingency variables would require excessive speculation, since several of the contingency variables have not been examined previously in a way that would inform such hypotheses. As will be seen later in this paper, we report our findings in a way that allows readers to observe individual relationships. Thus, scholars who are interested in developing detailed theories about particular contingency variables will have access to pertinent results about those variables even though we did not attempt to assess them. This general study is a beginning; inquiry into the roles and strategic effects of different contingency variables should continue.

DISCUSSION OF CONTINGENCY VARIABLES AND HYPOTHESES

Contingency variables are usually thought to be environmental; businesses have little or no control over them and they therefore form the contexts in which businesses must develop strategies. However, another group of variables that denote firms' strategic positions—and are therefore relatively fixed in the short run—could also be considered as contingency variables. Examples of such variables are market share, vertical integration, and brand image (Hambrick, 1983b). Some research has treated these as contingency variables, especially market share (e. g., Hamermesh, Anderson, & Harris, 1978; MacMillan et al., 1982; Woo & Cooper, 1981), and more such research is needed. However, in this paper we focus strictly on environmental contingency variables, with the expectation that examination of position contingency variables will occur later.

This section provides our rationale for including each of the ten contingency variables examined in this study. Even though the set is fairly encompassing, it is not exhaustive, because it was limited by what was available in the data base. Discussion of the ten variables starts with the one hypothesized as most significant; the others that we expected to be of major significance follow; and then come those that were expected to be of secondary significance.

Stage of Product Life Cycle

Probably no contingency variable has received more attention in the business strategy literature than product life cycle. Many researchers have theorized about how strategies should differ according to stage of the life cycle (e. g., Fox, 1973; Levitt, 1965; Porter, 1980; Tushman & Moore, 1982; Wasson, 1974). Moreover, Hofer (1975) went so far as to speculate that this was the most significant contingency variable in formulating business strategy. There is empirical evidence that stage of life cycle is a useful contingency variable (Anderson & Zeithaml, 1984; MacMillan et al., 1982) but, as is true for all the variables this study examined, there has been no indication of how its significance compares to that of other contingency variables. Since so

many facets of the business seem to depend on stage of product life cycle—production technology, buyer criteria, capital intensity, the nature of competition, and others—Hofer's hypothesis that this is the most significant contingency variable seemed reasonable.

User Sector: Consumer or Industrial

The marketing literature has commonly posited a major difference between consumer- and industrial-product settings (Risley, 1972; Stanton, 1981; Udell, 1972; Webster, 1979). It has also been common for researchers to control for sector by drawing samples from only the consumer sector (e. g., Bush, 1973; Kyle, 1972; Porter, 1974) or from only the industrial sector (Ames, 1968; Hambrick, Macmillan, & Day, 1982; Rippe, Wilkinson, & Morrison, 1976). However, with a few exceptions (e. g., Day et al., 1983), studies have not undertaken direct tests of differences in strategic phenomena between the consumer and industrial sectors. As summarized by Day and colleagues, the fundamental differences between the two sectors seem to concern buyer dispersion, buyer needs and knowledgeability, and demand uncertainty. Such differences should give rise to significant differences in strategic phenomena for businesses in the two sectors; thus the consumer/industrial dichotomy also qualified as a contingency variable of primary significance.

Product Differentiability

The concept of product differentiation surfaces regularly in the industrial economics literature.² Studies have viewed product differentiation primarily as a barrier to entry that affects overall industry profitability. At the business level, Abernathy and Wayne (1974) argued that experience effects are limited when competitors are able to segment markets with high quality or customized goods. More generally, an undifferentiated product requires firms to attend primarily to cost and capacity considerations, whereas a product that can be highly differentiated opens up many more avenues of competition. Degrees of product differentiability should give rise to differences in the ways value is added, the needs and criteria of buyers, and the nature of competition. Taken together, these widespread differences suggested that product differentiability should be another contingency variable of primary significance.

Technological Change

Whether an industry has undergone a recent major technological change is another potentially important contingency variable, because major technological changes lead to redistribution of market shares among competitors (Porter, 1983). Moreover, firms encounter very different issues concerning resource allocation and competitive weapons depending on whether there have been recent technological changes in their industries (Foster, 1982).

² Hay and Morris (1979) have summarized this concept.

This variable should be associated with major differences among businesses in how value is added, in buyer needs and knowledgeability, and in the nature of competition. Thus, we also hypothesized technological change as a contingency variable of primary significance.

Concentration Rate

Rate of concentration in an industry is a prominent variable in the industrial economics literature; it has typically been presumed to determine the degree of opportunity for collusion. Empirical support for that idea has been mixed.³ Few empirical strategy studies have included concentration rate as a contingency variable (Harrigan, 1980, 1983), although it was one of the variables Hofer (1975) proposed. Since concentration rate may reflect the nature of competition, but not much about how value is added or buyers' needs, we expected it to be among several contingency variables of secondary significance.

Purchase Frequency

Past studies have shown the frequency with which end users purchase products to be a significant contingency variable (Hambrick, 1986; Schoeffler, Buzzell, & Heany, 1974). Purchase frequency determines buyer criteria and knowledgeability; moreover, since it also affects the lumpiness of demand, it may affect the nature of competition. We expected purchase frequency to be a significant contingency variable, but of secondary significance.

Industry Imports

Porter (1980) rated the degree of world wide competition as one of the most important contingency variables for competitive strategy. Level of imports in an industry is a useful, although not ideal, indicator of world wide competition. Import levels indicate something about the nature of competition, but do not necessarily indicate anything about buyer needs or ways in which value is added. Thus, we expected level of imports to be a significant, though secondary, contingency variable.

Share Instability

The degree to which market shares in an industry are unstable indicates rivalry to some extent. Exogenous shocks like imports or product innovations can destabilize shares. Conditions that break oligopolistic bargains, such as fragmentation, can also do so (Caves & Porter, 1978). Share instability has been shown to be a significant contingency variable, especially in determining the effects of firms' fixed asset mixes and utilization rates on profitability (Hambrick, 1986; Hambrick & MacMillan, 1984). We expected that share instability would be of secondary significance.

³ See Hay and Morris (1979) for a summary.

Demand Instability

Demand instability is a routine variable for economists, but strategists have not really examined it. However, demand instability should have major effects on the nature of competition, because competitors will fight hard to cover fixed costs during slow times. It should also affect outcomes of various fixed asset strategies, much in the same way as does share instability. We expected that demand instability would be a significant but secondary contingency variable.

Dollar Importance to Customers

Porter (1980) argued that the dollar importance of products to customers will affect their tendencies to bargain for favorable prices. This means that if a product represents a large portion of a customer's dollar purchases, the customer will make a point of becoming very knowledgeable about the product and about alternative suppliers and will shop aggressively. Its apparent implications for buyer behavior suggested that dollar importance might be of some significance as a contingency variable. Although it is difficult to envision how this variable would have widespread significance in a contingency framework, we expected it to be of some significance.

Summary of Hypotheses

The hypotheses for this study were:

Hypotheses 1: All ten of the contingency variables to be examined will be of significance. That is, firms that differ on these variables will also differ in how their strategic attributes are associated with performance.

Hypotheses 2: Stage of product life cycle will be the most significant contingency variable (Hofer, 1975).

Hypothesis 3: The ten variables fall into the following rough classes as to their expected importance:

Primary	Secondary
Stage of product life cycle	Concentration rate
Consumer vs. industrial sector	Purchase frequency
Product differentiability	Industry imports
Technological change	Share instability
	Demand instability
	Dollar importance to customer

METHODS

Data

The data used in this study were drawn from the Profit Impact of Market Strategies (PIMS) project—an ongoing, large-scale statistical study of environ-

mental, strategic, and performance variables for individual business units.⁴ This study involved drawing subsamples from the full pool of 1,470 businesses in the data set. We used four-year averages and the latest data available on each business throughout. The large size of the PIMS data base, and its business-level focus, make it quite possibly the only source from which data for a study like this could be obtained.

Variables and Measures

The variables and measures used in this study will be discussed by conceptual category.

Contingency variables. At the heart of the study were the ten contingency variables whose relative degrees of importance were examined. Since the analyses we conducted required low and high subsamples for each contingency variable, we had to establish cut points. These were evident in those cases where there were basically two possible classes, such as growth versus mature stage of life cycle, or consumer versus industrial product. In other cases, we used judgment to establish the cut points, typically guided by major inflections or breakpoints in frequency distributions. In general, we omitted the observations closest to the centers of each distribution so as to minimize blurred midvalues; but we also avoided making cut points at the extremes of the distributions. Thus, roughly the bottom quarter or third of each distribution became the low subsample, and a similar portion at the top became the high subsample. The Appendix presents the frequency distributions and cut points. Choosing cut points was not an incidental issue, since if very extreme cut points were used for a contingency variable, ensuing analyses could have made it look very significant. The intercorrelations among the contingency variables were all less than $\pm .20$, evidence that none of the contingency variables were redundant.

Strategic attributes. The aim of the study was to assess the overall levels of significance of different contingency variables in moderating the effects of various strategic attributes on performance. To be a fair and comprehensive test, the study needed a reasonably complete set of strategic attributes. Considering only a small set would have given us no confidence that we had at all approximated the contingency variables' overall levels of significance.

As a start, we examined all strategic attributes that had been prominent in past PIMS studies; a previous study (Hambrick, 1983b) reported some of these attributes to have been identified by a panel of PIMS experts as strategic position and choice variables. We determined several variables to have very restricted distribution of responses—typically, nominal and ordinal scales for which one answer appeared over 80 percent of the time. Moreover, many of the variables were highly intercorrelated (above .40). After discarding variables with either of these problems, we had a set of 20. Care was taken to retain those variables that were best established theoretically and most promis-

⁴ For technical summaries and critiques, see Anderson and Paine (1978), Hambrick and colleagues (1982), and Schoeffler (1977).

ing statistically. Nevertheless, the choice of these 20 variables circumscribes the findings of this study.

Table 1 lists these variables under categories set forth in a previous study (Hambrick, 1983b).⁵ The intercorrelations among the 20 strategic attributes for the overall sample were all less than $\pm .40$, a level low enough to preclude seriously unstable model estimations.

Performance. Return on Investment (ROI) was the performance measure. The use of four-year averages helped to minimize its accounting-related limitations. We did not consider additional performance measures, such as cash flow and changes in market share, because of space limitations. Their eventual examination is of importance.

ANALYSIS AND RESULTS

This study concerned differences within pairs of contingency-based subsamples as to associations between strategic attributes and performance. A relatively straightforward technique for observing such differences is to conduct a Chow test (Maddala, 1977) for homogeneity of regression results. We will discuss this test more fully later in this section.

The data analyses required uniform sample sizes for each pair of contingency subsamples in order for any statistical comparisons across the contingency variables to be meaningful. Thus, all low subsamples had to be of the same size, and all high subsamples had to be of the same size in every analysis. However, the low and high subsamples did not have to equal each other in size. The chosen subsample sizes could of course be no larger than the smallest samples available. For the low samples, this was the growth sample for the variable stage of product life cycle, for which $n = 290$. The smallest high sample was the recent change group for the variable technological change, in which $n = 346$. Therefore, we drew random subsamples of $n = 290$ from every low sample and drew random subsamples of $n = 346$ for every high sample. All analyses reported were based on these subsample sizes.

It may be most useful to describe the Chow test in the context of some actual results. Let us take the case of the contingency variable we hypothesized as being the strongest—stage of product life cycle. As described in the preceding paragraph, we drew subsamples of 290 growth businesses and 346 mature businesses. Briefly, we were interested in knowing whether the associations between the various strategic attributes and performance differed appreciably between the two subsamples (recall Figure 2). Our hypothesis was that they would differ, and more so for stage of life cycle than for other contingency splits.

The first step was to run separate regressions for the two subsamples with performance as the dependent variable and the 20 strategic attributes—carefully selected to eliminate multicollinearities—as the independent variables. Table 1a gives the results of these two regressions. Preliminary

⁵ The authors will provide detailed definitions of the variables upon request.

TABLE 1
Some Illustrative Regression Results: Stage of Life Cycle
and Random Subsamples^a

Strategic Attributes	(a) Life Cycle Stage		(b) Random Split	
	Growth (n = 290)	Mature (n = 346)	Sample 1 (n = 290)	Sample 2 (n = 346)
Asset mix and utilization				
Receivables/sales	-.03	-.05	-.01	-.02
Inventories/sales	-.28	*	-.22	-.23
Gross fixed assets/sales	-.30	**	-.14	-.16
Plant and equipment newness	-.24	**	-.18	-.19
Capacity utilization	.08	.13	.15	.16
Cost Efficiency				
Relative direct cost	-.10	-.13	-.08	-.08
Manufacturing/sales	.10	***	-.11	-.10
Process R & D/sales	-.06	.02	.00	.00
Employee productivity	.16	.09	.13	.12
Differentiation				
Relative price	.07	.05	.04	.06
Relative product quality	.09	.15	.19	.19
Relative promotion expense	.00	.04	.00	-.02
Percent new products	-.15	-.04	-.02	-.04
Promotion expense/sales	-.04	-.06	-.06	-.06
Product R & D/sales	.07	.06	.03	.05
Product customization	-.08	-.05	.01	.02
Scale and Scope				
Relative market share	.12	.11	.09	.10
Relative forward integration	-.19	***	.02	.01
Relative backward integration	.03	.04	.03	.03
Percent sales to end users	-.05	.01	-.03	-.03
R ²	.45	.39	.34	.36
Pooled R ²		.34		.35
Average improvement in R ²		.08		.00

^a Standardized coefficients (betas) reported.

*p < .10 for differences in betas when converted to partial correlations and employing Fisher's Z-test.

**p < .05

***p < .01

analyses suggest that there are some significant differences between the betas, based on converting them to partial correlations and employing Fisher's Z-test. But are the two regressions significantly different overall?

The next step was to run regressions for the two subsamples pooled together (n = 636). Of primary interest were the sum of squared errors for the pooled sample (SSE_p) and the extent to which that value differed from the errors obtained from the two subsample regressions. If the errors for the two subsamples were small relative to the errors for the pooled sample, the

best-fitting models for the two subsamples differed from one other. The specific form of the Chow test as applied to the results for stage of product life cycle is:

$$F = \frac{\frac{[SSE_p - (SSE_1 + SSE_2)]}{k}}{\frac{(SSE_1 + SSE_2)}{(n_1 + n_2 - 2k - 2)}}$$

where

SSE_p = sum of squared errors for pooled samples,
 SSE_1 = sum of squared errors for subsample 1,
 SSE_2 = sum of squared errors for subsample 2,
 n_1 = size of subsample 1,
 n_2 = size of subsample 2, and
 k = number of independent variables.

For the results for stage of product life cycle:

$$F_{20,594} = \frac{\frac{[239,888 - (110,852 + 103,436)]}{20}}{\frac{[110,852 + 103,436]}{[290 + 346 - 2(20) - 2]}}$$

$$F_{20,594} = 3.39 .$$

The bottom line of the Chow test is an F -statistic, that can be interpreted from an F -statistic table. In the case of stage of product life cycle, shown above, F was significant at the .001 level. It thus appeared that stage of product life cycle was a significant contingency variable; there were significant differences in the associations between the strategic attributes examined and ROI in businesses showing growth or maturity. Another less rigorous indicator of improved estimation with a growth versus maturity split was the average improvement of .08 in R^2 s over the pooled sample: $[(.45 - .34) + (.39 - .34)] / 2$.

In contrast, for demonstrative purposes, Table 1b gives the betas obtained from analyzing two completely random samples; there were almost no differences in betas, a nil F -statistic, and no improvement in average R^2 .

Next, a question arose as to the magnitude of these differences between growth and mature businesses compared to the differences that appeared with other possible contingency splits. Which contingency variables were the most significant? The fact that each Chow test yields a concise indicator

of significance, the F -statistic, allowed a rough ordering of contingency variables.⁶ Lacking a conclusive way to test for differences in F -statistics, we could make no definitive statements. However, scholars generally consider the Chow test to be extremely stringent, so that increments in the F -statistics derived through it are noteworthy (Maddala, 1977).

The results, graphed in Figure 3, indicate that all of the contingency variables are of potential interest to researchers and strategists in terms of their Chow tests. That is, the strategic attributes examined show different overall effects on performance, as values for each of our ten contingency variables vary.

Moreover, these results shed some light on the relative degrees of significance of these contingency variables. It would be misleading to attempt to derive a strict rank ordering of the variables, but they can be described in terms of their rough positions. User sector, consumer or industrial ($F = 5.01$), and purchase frequency ($F = 4.80$) appear to be much more significant than any of the other contingency variables. Next, clustered together above the .001 significance level were stage of product life cycle ($F = 3.39$), dollar importance ($F = 2.73$), technological change ($F = 2.69$), and differentiability ($F = 2.45$). Next, clustered together above the .05 significance level were imports ($F = 1.93$), demand instability ($F = 1.82$), concentration ($F = 1.82$), and market share instability ($F = 1.57$).

As a more graphic way of portraying the magnitude of differences, Table 2 with its nine subfigures presents the strategic attributes whose betas differed significantly.⁷ The subfigures are ordered according to the magnitude of their F -statistics derived from the Chow tests.⁸ Numerous and very major differences between the consumer- and industrial-product subsamples (Table 2a) are evident. But, in contrast, few differences appear for the low and high share-instability subsamples (Table 2i).

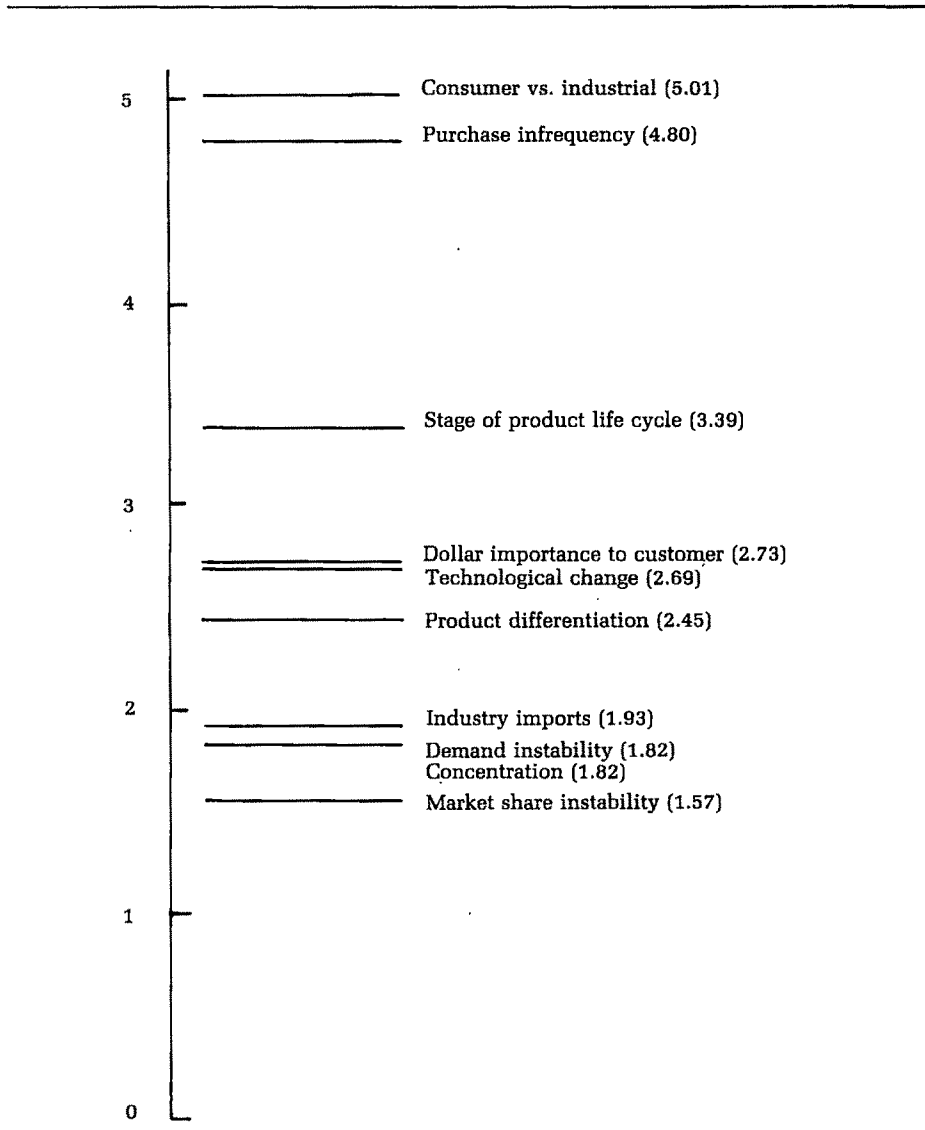
Since the purpose of this study was to identify the contingency variables that give rise to important differences, but not to appraise the detailed substance of those differences, we will not attempt to discuss the details of Table 2. However, each subfigure may have further theoretical and managerial implications. For example, Table 2c reveals several differences between settings characterized by low dollar importance and high dollar importance. In low importance settings, market share, price, and manufacturing expenses tended to have positive effects, and product quality, accounts receivable, and promotion expenses tended to have negative effects. What underlies these differences? What are their strategic and tactical implications? This study should stimulate pursuit of such questions.

⁶ Again, to allow direct comparisons of F -statistics, all low subsamples had $n = 290$ and all high subsamples had $n = 346$. A check confirmed that the error terms for the ten pooled samples (SSE_p) all fell within a narrow (10%) range of each other, which was to be expected since the samples were random, large, and of equal sizes.

⁷ Again, we converted betas to partial correlation coefficients and used Fisher's Z -test.

⁸ Recall that the results for stage of product life cycle appeared earlier in Table 1.

FIGURE 3
Relative Positions of *F*-Statistics^a Derived from Chow Tests for Subsamples Split According to Contingency Variables



^aCritical *F* levels are 2.27, $p < .001$; 1.88, $p < .01$; 1.57, $p < .05$.

It is instructive to note briefly that some of the individual patterns in Table 2 are consistent with those observed in other PIMS-based studies of more narrow scope than the present study. For example, Table 2a corroborates the earlier finding by Day and colleagues (1983) that market share has a

TABLE
Regression Results for Contingency

Strategic Attributes	(a) User Type		(b) Purchase Infrequency	
	Consumer (n = 290)	Industrial (n = 346)	Frequent (n = 290)	Infrequent (n = 346)
Asset mix and utilization				
Receivables/sales	.14 ***	-.04		
Inventories/sales	-.10 **	-.24	.02 ***	-.26
Gross fixed assets/sales	-.09 *	-.20		
Plant and equipment newness				
Capacity utilization			.24 ***	.02
Cost efficiency				
Relative direct cost				
Manufacturing/sales	-.23 ***	-.02		
Process R & D/sales	-.14 **	.00		
Employee productivity				
Differentiation				
Relative price	-.04 *	.08		
Relative product quality				
Relative promotion expense				
Percent new products	.04 *	-.06	-.06 **	.08
Promotion expense/sales	-.07 *	.04	-.11 **	.08
Product R & D/sales			.13 ***	-.09
Product customization				
Scale and scope				
Relative market share	.21 **	.06		
Relative forward integration			-.09 **	.05
Relative backward integration			-.07 **	.06
Percent sales to end users	.09 ***	-.09		
R ²	.54	.39	.41	.57
Pooled R ²		.35		.37
Average improvement in R ²		.115		.120

^a Standardized coefficients reported only for variables whose betas differed significantly across the two subsamples.

*Difference significant at $p < .10$

** $p < .05$

*** $p < .01$

stronger positive link to ROI for consumer businesses than industrial businesses. Table 2i reinforces the earlier finding by Hambrick and MacMillan (1984) that capital intensity has a stronger negative link to ROI in settings characterized by unstable market shares than in those with stable shares.

DISCUSSION AND IMPLICATIONS

All the contingency variables yielded significant differences in the associations between strategic attributes and ROI, as demonstrated by Chow tests. These variables should be considered of potential interest to research-

2 Split Samples^a

(c) Dollar Importance to Customer			(d) Technological Change			(e) Product Differentiation		
Low (n = 290)		High (n = 346)	Stable (n = 290)		Dynamic (n = 346)	Undifferentiated (n = 290)		Differentiated (n = 346)
-.05	*	.05						
			-.15	*	-.25			
			-.25	**	-.10			
-.02	*	-.13	-.19	***	.02	-.21	*	-.12
						-.08	*	.03
.09	*	-.03						
.05	**	.20	.24	*	.14			
						-.08	**	.07
-.12	***	.06				-.05	*	.05
						-.06	*	.06
.16	**	.00				-.01	*	.11
						-.10	*	.01
			.09	*	-.02			
			.00	***	-.21			
.39		.35	.40		.44	.38		.38
	.32			.36			.34	
	.050			.060			.040	

*Difference significant at $p < .10$

** $p < .05$

*** $p < .01$

ers and strategists. Moreover, the results shed some light on the relative degrees of significance of the ten contingency variables. Examining the relative results of the Chow tests revealed that user sector, consumer or industrial, and purchase infrequency were by far the most significant of the variables tested. Businesses that differed on either of these two dimensions also had very different associations between their strategic attributes and performance. Thus, results support the hypothesis that these two variables would be of primary significance.

Stage of product life cycle, instead of being most significant—as both Hofer (1975) and the present study hypothesized—ranked a distant but still very strong third among the ten variables examined. There appears little

TABLE 2 (continued)

Strategic Attributes	(f) Industry Imports		(g) Demand Instability	
	Low (n = 290)	High (n = 346)	Stable (n = 290)	Unstable (n = 346)
Asset mix and utilization				
Receivables/sales				
Inventories/sales				
Gross fixed assets/sales				
Plant and equipment newness	-.22	**	-.09	**
Capacity utilization				.04
Cost efficiency				
Relative direct cost	-.14	*	-.02	
Manufacturing/sales				
Process R & D/ sales				
Employee productivity			.12	*
Differentiation				
Relative price	.11	*	.02	**
Relative product quality			.17	*
Relative promotion expense				
Percent new products	-.06	*	.04	*
Promotion expense/sales				-.14
Product R & D/sales				
Product customization	-.05	*	.05	
Scale and scope				
Relative market share	.06	*	.05	*
Relative forward integration	-.03	*	.07	
Relative backward integration			.10	**
Percent sales to end users				-.03
R ²	.35	.42	.33	.41
Pooled R ²		.33		.32
Average improvement in R ²		.055		.050

*Difference significant at $p < .10$ ** $p < .05$ *** $p < .01$

doubt that stage of life cycle is of major consequence, but it may not be the key to the Gordian knot of strategy, as so many have assumed. We should note that our chosen performance variable, ROI, may have been an inappropriate focus for growth businesses. This is a fair criticism that we will discuss later in this paper, along with other limitations of the study. However, it can be noted in defense that growth businesses are generally far more interested in profitability than are introductory-stage businesses, and that growth businesses have the same average ROI levels as mature businesses (Hambrick et al., 1982).

The next set of variables that formed a tight group and were highly significant were dollar importance, technological change, and differentiability.

TABLE 2 (continued)

Strategic Attributes	(h) Concentration		(i) Share Instability	
	Fragmented (n = 290)	Concentrated (n = 346)	Stable (n = 290)	Unstable (n = 346)
Asset mix and utilization				
Receivables/sales				
Inventories/sales				
Gross fixed assets/sales			-.18	**
Plant and equipment newness				-.30
Capacity utilization				
Cost efficiency				
Relative direct cost	-.20	**	-.07	
Manufacturing/sales				
Process R & D/sales			.04	*
Employee productivity	.21	*	.07	*
Differentiation				
Relative price				
Relative product quality				
Relative promotion expense				
Percent new products				
Promotion expense/sales	.07	*	-.04	
Product R & D/sales				
Product customization	.11	**	-.04	
Scale and scope				
Relative market share				
Relative forward integration				
Relative backward integration	-.04	*	.05	-.05
Percent sales to end users	-.18	***	.03	**
R ²	.42		.37	.37
Pooled R ²		.35		.37
Average improvement in R ²		.045		.035

*Difference is significant at $p < .10$ ** $p < .05$ *** $p < .01$

We had hypothesized the second two variables as being of primary significance, so their location in the hierarchy of results was not particularly surprising. However, we had expected dollar importance of products to be of secondary significance, since it has only previously appeared in discussions of the relatively narrow issue of buyer power (Porter, 1980). Apparently, dollar importance of products may have broader and deeper implications than previously thought, and future strategy research should treat it as a potentially meaningful moderating variable.

Finally, yet still significant, were the variables: imports, demand instability, concentration, and market share instability. We had expected all of these to be of secondary significance, since they appeared to have relatively

narrow implications for strategy. Results seem to have borne out those assumptions. These variables were of interest, but did not have the pronounced effects of the higher ranking variables.

In sum, these results offer new evidence for researchers and strategists about the relative overall degrees of significance of ten prominent contingency variables.

Implications

For researchers. This paper would seem to have important implications for researchers that concern both theory development and research design. First, the results should help steer theoretical inquiry, since they suggest where our priorities should lie. For example, this study highlighted the apparent significance of purchase frequency as a contingency variable, so it should be a primary candidate for intensive study. What exactly distinguishes settings characterized by frequent purchases from settings with infrequent purchases? Is this split tantamount to a durables-nondurables division? Or to a split between convenience good and shopping good? Why are there differences in the links between strategic attributes and performance in settings characterized by frequent purchases and those with infrequent purchases? Such explanations fall outside the scope of the current study, but they deserve systematic exploration. What this study does contribute is an indication of which contingency variables ought to be studied first.

This study should also help in research designs, particularly in sample selection. Over-aggregation is a common problem faced by empirical investigators; that is, they may inappropriately pool observations from different settings (Hatten et al., 1978). This study delineated, to some extent, the dimensions along which overaggregation could be most serious. For example, it appears that researchers would be wise not to mix consumer-product and industrial-product businesses in any studies of business strategy. Or, in view of our previous point, it would be important to study the differences between samples drawn from those two settings. In contrast, it would not in general seem crucial that sampling procedures for most strategy studies control carefully for concentration rates of industries.

For strategists. These results are far from conclusive, so we cannot make reliable suggestions to strategists. However, we can identify the types of implications that could emerge from similar but more complete research. First, executives would have some empirically supported idea of the degree to which different types of settings require different strategic considerations. Viewed another way, research could identify the magnitude or width of different strategic chasms across which strategic formulae or recipes are least transferable (Grinyer & Spender, 1979). For example, in this project, the consumer versus industrial chasm appeared to be substantial, whereas the stable-share versus unstable-share chasm appeared to be modest. If later research confirms these patterns, they may have major implications for such issues as diversification and selection of general managers. For example, a firm that has applied a masterful strategy in the industrial-product sector

may find that the consumer-product sector is very different, conceivably even far outside its realm of competence. In contrast, the chasm between concentrated and fragmented industries may not be nearly as great, and firms moving from one to another may not need to be as concerned about pervasive mismatches of skills and aptitudes. An accumulation of research similarly could allow inferences about the transferability of managers. For example, it may be that general managers transferred from consumer-product to industrial-product settings would have greater likelihoods of failure through misapplying their previous experience than would managers transferred from businesses in fragmented industries to those in concentrated industries. Replications and refinement of this study may aid firms to understand the sizes of various chasms and to thus strengthen their decisions about corporate strategy, business strategy, and executive deployment.

LIMITATIONS AND UNANSWERED QUESTIONS

This study was far from a definitive or final statement on the relative degrees of significance of contingency variables in the field of strategy. It had notable limitations that leave several key questions unanswered.

First, the study did not examine all possible contingency variables. There are others in the PIMS data base⁹ that might have yielded significant patterns but were excluded in favor of those variables that were more prominent in the literature and that appeared more promising. Moreover, some key variables, such as capital intensity and advertising intensity in industries, have established footings in the literature but were not available in the data set; hence, we could not examine them. Finally, we examined only environmental contingency variables. Similar inquiries need to be made for position contingency variables like market share, vertical integration, and product quality.

Second, the study examined the moderating effects of contingency variables on the relationship between performance and strategic attributes only. Other attributes, such as structures, decision processes, and managerial characteristics should figure in such studies. Unfortunately, however, such variables are to date unavailable in the PIMS data base. This is a notable shortcoming because it prevents including the types of variables around which theorists first conceived the contingency view (Burns & Stalker, 1961; Lawrence & Lorsch, 1967).

Third, the study included only one performance measure, ROI, thus presuming this measure to be both universally valid and reliable. Both presumptions are somewhat doubtful (Hambrick et al., 1982). However, the PIMS data set, and other data sets, lack better measures, so our results will have to be taken as incomplete. We view ROI as a somewhat more widely applicable measure than two others that are commonly used, change in market shares and cash flow. Others may wish to do our type of analysis using other criterion measures. We bypassed such an endeavor for the sake

⁹ For example, growth of wage rates in industries and industries' exports are available.

of manageability, but perhaps we have at least set the stage so that others can readily undertake such analyses.

A fourth limitation of this study was its cross-sectional nature. The real linkages between environment, strategy, and performance occur in a complex, lagged fashion that ideally merits longitudinal study. To date, however, too few PIMS observations have been in the data base long enough to allow a longitudinal design that would qualify as a major improvement over the analysis presented here. Longitudinal versions of this study may be possible in the future.

Finally, the study relied exclusively on econometric techniques. That is, it tested for differences in the linear, independent effects of strategic attributes on performance in different contingency settings. As a previous study (Hambrick, 1983b) noted, such tests do not really tap the ways in which strategic attributes form interdependent wholes or gestalts or how those gestalts might differ between different contingency settings. Future researchers might undertake taxonomic inquiries in which they could calculate *n*-dimensional distances between the high-performance gestalts in two contingency settings, such as consumer products versus industrial products. The taxonomic approach has become integral for the field of strategy and could provide a major refinement of the present study.

SUMMARY

This study was a first attempt to prioritize contingency variables empirically for the field of strategy. Chow tests for structural homogeneity shed light on the relative significance of different contingency variables. User sector, consumer or industrial; purchase infrequency; and stage of product life cycle appeared to be of primary significance. The other variables examined were of less significance. The results have value for researchers primarily in providing guidance toward the most fertile inquiries into strategic contingencies. For practicing strategists, this type of research may eventually identify major strategic chasms—circumstances that engender great differences in the ways in which strategic attributes are associated with profitability. The paper has limitations that we hope will prompt continued and refined research into identification of the contingency variables that are of paramount significance to the field of strategy.

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APPENDIX

This appendix defines the ten contingency variables and specifies the cut points used for establishing the low and high samples.

User sector: Defines the broad sector of a business' basic market.

Consumer (low): Includes consumer nondurables and consumer durables (42.4% of all observations)

Industrial (high): Capital goods, raw materials, components, supplies, and consumable products (51.9% of all observations)

(Service businesses were excluded because sample sizes were very small.)

Stage of product life cycle: Describes the stage of development of the product and services sold by a business over the last three years.

Growth (low): Markets growing at more than 10% annually in real terms; technology or competitive structure still changing (19.7% of all observations)

Mature (high): Growth below 10% per year; products familiar to vast majority of users; technology and competitive structure reasonably stable (71.0% of all observations)

(Businesses in the emerging and declining stages were excluded because of very small sample sizes.)

Technological change: Defined by the question, "Has there been a change in technology of the product or production process in the past eight years?"

Stable technology (low): No (76.4% of all observations)

Recent change (high): Yes (23.6% of all observations)

Purchase infrequency: Defined by "How often do this business' end users typically purchase its products or services?"

Frequently purchased (low): Once per month or more often (23.5% of all observations)

Infrequently purchased (high): Once every year or less often (27.3% of all observations)

Concentration: Defined by percent of industry sales by four largest competitors.

Fragmented (low): $\leq 55.00\%$ (32.2% of all observations)

Concentrated (high): $\geq 60.00\%$ (49.1% of all observations)

Demand instability: Ten-year average annual variability from trend line in primary demand.

Stable demand (low): $\leq .10$ (35.3% of all observations)

Unstable demand (high): $\geq .40$ (25.1% of all observations)

Dollar importance to customers: Proportion of total annual purchases by average immediate customers.

Unimportant product (low): $\leq 1.00\%$ (36.2% of all observations)

Important product (high): $\geq 5.00\%$ (38.5% of all observations)

Product differentiability: Defined as percent of sales from superior products plus percent from inferior products.

Commodity product (low): ≤ 25 (26.6% of all observations)

Differentiated product (high): ≥ 65 (24.8% of all observations)

Industry imports: Industry sales in United States accounted for by establishments outside the United States.

Low imports (low): $\leq 0.10\%$ (45.5% of all observations)

High imports (high): $\geq 5.00\%$ (32.7% of all observations)

Share instability: Total annual share-point movements among top four competitors summed over four-year period.

Stable shares (low): ≤ 10 (33.2% of all observations)

Unstable shares (high): ≥ 20 (32% of all observations)

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PRODUCT-MARKET DIVERSIFICATION AND MARKET POWER

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This study examines relationships among diversification, market structure, and firm performance. Theory and empirical data are offered that argue that highly diversified firms have lower market power in their respective markets than do less diversified firms. This view is contrasted with the traditional market power theory that emphasizes the general rather than the specific market power of diversified firms.

Beginning with Gort's *Diversification and Integration in American Industry*, published in 1962, several works have examined the relationship between diversification and the performance of firms or industries (e. g., Bass, 1973; Bass, Cattin, & Wittink, 1978; Miller, 1969; Rhoades, 1973). For the most part, the results of these studies have been inconclusive and contradictory, and have not demonstrated a clear relationship between diversification and profitability. Using qualitative measures of diversification in place of the measures based on Standard Industrial Classification (SIC) codes used in other studies, Christensen and Montgomery (1981) and Rumelt (1974) found significant performance differences among different types of diversifiers. These qualitative measures have been well received in the strategy literature; their absence is commonly accepted as the explanation for the lack of significant findings in previous work. Although there appears to be some merit in this view, accepting it as the sole explanation for differences in performance has tended to close discussion on other causes for the disparate empirical findings.

A review of the diversification work in the industrial organization paradigm suggests that the contradictory findings may also be due to a faulty theoretical base. Economists expect to see a positive relationship between diversification and performance, yet their expectation rests on a theory of market power that is itself assumed, not tested. Focusing on that issue, this paper suggests that the economic theory of market power as applied to diversified firms has overemphasized what may be termed collusive or general market power, and underemphasized the roles of specific skills and specific market power that give firms advantages in individual market settings. This study presents theory and empirical evidence that support this contention

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and indicate that highly diversified firms have significantly lower, not higher, market power in their respective markets than do less diversified firms. Thus, the result that highly diversified firms do not have levels of profitability that are higher than average is not surprising.

HYPOTHESES

First, why do economists expect a positive relationship between product-market diversification and economic performance? Traditional market power theory provides an explanation. According to Shepherd (1970) "Market power is the ability of a market participant or group of participants (persons, firms, partnerships, or others) to influence price, quality, and the nature of the product in the marketplace" (1970: 3). In turn, market power can lead to uncompetitively high and risk-free profits. According to this perspective, diversification increases opportunities for predatory pricing and reciprocal buying and may reduce intraindustry rivalry if several large conglomerates face each other in many markets (Caves, 1981; Miller, 1973).

In essence, this view of market power argues that diversified firms bring a generalized collusive power to the new markets they enter. For example, the ability of these firms to engage in predatory pricing (Scherer, 1980; Shepherd, 1970) is independent of the specific markets they enter and is in fact enhanced by the number of markets in which they compete. Although this view emphasizes the general power diversifying firms may bring to new markets, it ignores a number of counteracting forces. One such force is the specific power a firm has in a market—its market share—and the specific skills required to gain dominance in a particular market.

Depending on the distance from their core markets, highly diversified firms are likely to be at competitive disadvantages compared with specialized firms when they attempt to address critical success factors in specific industries. Generalized management skills and access to capital, though valuable, are common management resources. Additionally, the internal management structures of highly diversified firms often discourage heavy commitments of corporate resources either to single markets or to specialized assets that may be necessary to capture key competitive positions in some markets. These points lead to the first hypothesis:

Hypothesis 1: Highly diversified firms will have lower market shares in their respective markets than less diversified firms.

Further implications emerge if one views diversification as a defensive move. In this view, firms would enter new markets to avoid unattractive conditions or limited potential in their present markets, thus moving from weakness, not strength. They diversify in search of opportunities that are unavailable to them in their home markets. It is important to consider not only the power these firms wield in such circumstances, but also the power they are likely to lack. What kinds of markets are highly diversified firms most likely to enter given such circumstances?

Caves, Porter, and Spence (1980) found that diversifying firms did not tend to enter the most profitable markets. Presumably, highly profitable markets have high entry barriers that make it difficult for nondifferentiated competitors to compete successfully. Instead, Caves and colleagues found that diversifying firms tended to enter markets with moderate seller concentration whose entry barriers and average profitability were likely to be lower than those of highly profitable markets. This argument suggests two more hypotheses:

Hypothesis 2: The markets of highly diversified firms will have lower average levels of profitability than the markets of less diversified firms.

Hypothesis 3: The markets of highly diversified firms will have lower concentration levels than the markets of less diversified firms.

Together, these three hypotheses argue that, on the average, highly diversified firms will have lower market power than firms with lower levels of diversification.

If diversification conveys market power over and above that enjoyed in individual markets, an analysis should show profitability increasing with level of diversification, after it has controlled for market share, industry profitability, and concentration. Therefore, a multivariate model was necessary to test for the existence of generalized market power:

Hypothesis 4: Degree of diversification will not contribute to the explanation of firm profitability, after analysis controls for market share, industry profitability, and concentration.

METHODS AND SAMPLE

Univariate differences between highly diversified and less diversified firms were examined with *t*-tests. In keeping with the practices of traditional economic studies of firm performance (Rhoades, 1973; Shepherd, 1972), the multivariate test used was a linear additive model. Several studies have reported relationships between market growth (Bass et al., 1978; Rhoades, 1973), firm size (Bass, 1973; Gale, 1972), and the variables of interest in this study, market power and performance. In order to avoid spurious conclusions, the multiple regression model controlled for these variables as well as for market share, industry profitability, industry concentration, and firm diversification.

$$\text{ROIC} = b_0 + b_1 \text{ DIVERS4} + b_2 \text{ SHARE} + b_3 \text{ PROF1} + b_4 \text{ CON4} + b_5 \text{ GROW} + b_6 \text{ AVASSETS} \quad (1)$$

where

ROIC	=	return on firm's invested capital,
DIVERS4	=	extent of diversification in four-digit SIC markets,
SHARE	=	weighted market share,
PROF1	=	weighted industry return on assets (ROA),
CON4	=	four-firm concentration,
GROW	=	growth of firm's markets, and
AVASSETS	=	average total firm assets.

The study sample included 128 *Fortune* 500 firms ranging in level of diversification from single-line businesses to unrelated diversifiers. Vertically integrated firms were not included. The sample is a subset of Rumelt's (1974) random selection of *Fortune* 500 firms. Economic constraints on procuring data prohibited including all nine of Rumelt's categories; this study includes two of his high-performing categories, dominant-constrained and related-constrained; two of his medium-performing categories, related-linked and single business; and two of his low-performing categories, unrelated-portfolio and dominant-linked. These six categories represent the range of performance levels and major diversification types within the Rumelt sample. Previous studies based on the subset (Christensen & Montgomery, 1981; Montgomery, 1982) have indicated that it is an acceptable substitute for Rumelt's whole sample.

The Appendix gives variables' definitions and time frames. As is usual in studies of this type, it was not possible to get completely concurrent data, although the measures are all taken from the period 1972-77. Note that this research measured diversification as a continuous variable, using four-digit SIC revenues. Thus highly diversified firms had high index values, and firms with low levels of diversification had low values. There may be instances in which this measure assigned firms high levels of diversification when in fact they used the same key skills or resources in many markets. However, as a previous study (Montgomery, 1982) showed, in a large sample such cases do not dominate. That study also showed that this continuous measure of diversification is highly correlated with Rumelt's (1974) categorical measure. However, the continuous measure is more efficient to use and more comparable to the measures used in traditional economic studies than Rumelt's measure—an important point, since this study challenges some premises found in the economic studies.

To differentiate between highly diversified and less diversified firms, it was necessary to divide the whole sample into groups. Since no a priori reasoning pointed to any specific dividing point, the sample was split at the median, where the value for DIVERS4 = .7862. Inspection of a histogram showed that, in fact, the data themselves had no distinct breakpoint.

Return on invested capital (ROIC) measured overall performance levels of firms. This performance measure, widely used in strategy and economics research, controls for differences in financial structures across firms. Market

indices were weighted averages of the corresponding variables in each of the firms' individual markets; weights were the fractions of firms' total sales that were attributable to each SIC market. The sales data for these measures came from the *Establishment Database* (Economic Information Systems, 1977). Growth and concentration variables came respectively from the *Annual Survey of Manufacturers*, 1976 (U. S. Department of Commerce 1977), and the *Census of Manufacturers*, 1972 (U. S. Department of Commerce, 1975). The industry profitability data were at the three-digit level and came from 30,000 *Leading U. S. Corporations* (News Front, 1977).

RESULTS

The results of the t-tests shown in Table 1 demonstrate that, as expected, many significant differences exist between high and low diversifiers. On market power measures, firms with relatively low levels of diversification were consistently in stronger positions than firms with high levels of diversification. Significant category differences ($p < .05$) appeared in market share, market profitability, and 20-firm and 50-firm concentration levels. These results provide strong support for Hypotheses 1 and 2 and some support for Hypothesis 3. As a whole, the pattern supported the view that highly diversified firms are not firms with high levels of market power.

Table 2 shows the results of fitting Equation 1 to the sample of 128 firms. Industry profitability and market share entered the regression with significant coefficients. None of the other variables, including diversification, were significant.

A hierarchical regression was run to untangle the possible effects of collinearity among the independent variables. Simple correlation analyses (Table 3) showed that four-firm concentration, market growth, and diversification, variables that did not enter the regression, were correlated with variables that did enter the regression with significant coefficients. Therefore, a hierarchical regression was used to force these variables to enter the first stage of the analysis.

When this was done, neither the concentration nor the diversification variable were significant at the .05 level. However, when entered at this stage, the coefficient for market growth was highly significant ($p = .017$). These results indicated that collinear effects were operating on the first analysis, and suggested that the variance in performance that market profitability explains is, in part, associated with market growth as well.

Given these hierarchical regression results as well as the results of the full model, it appears that market share, market profitability, and market growth are positively related to firm performance. The fact that diversification did not enter the regressions was consistent with Hypothesis 4. These results provided no support for the collusive power view of diversification, which sees firms' profitability as a function of their diversification.

TABLE 1
Univariate Differences between Low and High Diversifiers

Variables	Overall Means	Overall Standard Deviations	Low Diversifiers' Means	High Diversifiers' Means	Value of t-Statistic	Probabilities ^a
Weighted market share	.0711	.0738	.0958	.0465	3.99	.000
Weighted industry return on assets	.0629	.0192	.0672	.0585	2.61	.005
Weighted industry return on equity	.1259	.0303	.1307	.1211	1.79	.037
4-firm concentration	.4275	.1365	.4386	.4163	.92	.179
8-firm concentration	.5591	.1361	.5735	.5447	1.20	.166
20-firm concentration	.7199	.1201	.7386	.7013	1.77	.040
50-firm concentration	.8417	.0946	.8558	.8276	1.70	.046
Diversification in four-digit markets	.7212	.2050	.5718	.8706	-12.05	.000
Return on invested capital, firm average 1975-1977	.1208	.0496	.1335	.1080	3.00	.001

^a One-tailed tests

TABLE 2
Multiple Regression Model

Variables	b	Standard Error	F	Significance
Weighted industry return on assets	.61	.24	6.28	.01
Weighted market share	.17	.06	7.18	.01
Growth of firm's markets, 1972-76	.17	.14	1.40	.24
Four-firm concentration	-.03	.03	.93	.34
Diversification in four-digit markets	-.01	.02	.39	.53
Average total assets, 1975-77	.00	.00	.09	.76
(Constant)	.07			
R ² =	.165			
Adjusted R ² =	.124			
F =	3.996			.001

TABLE 3
First-Order Correlation Coefficients

Variables	1	2	3	4	5	6
1. Return on invested capital	.					
2. Average total firm assets	.0026	—				
3. Weighted market share	.2390**	-.0230	—			
4. Weighted industry ROA	.3114**	-.0956	.0473	—		
5. Four-firm concentration	-.0099	.0389	.4559**	-.1848*	—	
6. Growth of firm's markets	.2113*	.0667	.0358	.3993**	.0495	—
7. Diversification in four-digit markets	-.1107	-.0446	-.1886*	-.0547	-.0751	-.0193

* $p < .05$

** $p < .01$

DISCUSSION

In summary, a categorical form of a continuous diversification measure demonstrated significant differences between high and low diversifiers. These differences suggest that the contradictory reports from past studies derived from conceptual problems, and were not solely due to the forms of diversification measures employed.

Contradicting the widely held view that highly diversified firms wield unfair market advantages, this study showed that highly diversified firms do not have strong market positions; it also showed that, on the average, they compete in less attractive markets than firms with relatively low levels of diversification. These results are consistent with the view that highly diversified firms in general have low, not high, market power. This finding has significant implications for public policy, and it challenges the view that highly diversified firms are anticompetitive.

The lessons of this work are also significant for managers. Corporate leaders would do well to remember that diversified firms must ultimately compete in a series of individual markets. Although some general benefits may extend across markets, the major determinants of success appear to be related to the strength of a firm's competitive position within its individual markets and to the average profitability of those markets.

Diversification may have advantages that derive from cost efficiencies rather than market power. The efficiency argument suggests that technical and market relatedness may lead to economies of scope that in turn yield economic benefits. This study concentrated on market power and market structure and did not explicitly examine issues relating to economies of scope. An extension of this paper could examine such economies while controlling for the effects of market power and market structure.

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APPENDIX

Definitions of Variables Used

The market power and market structure estimates are weighted sum measures. The percentage of a firm's total sales that occurred in each of its individual markets—namely,

m_{ij4} = the percentage of firm i 's total sales that are in four digit market j ¹
or

m_{ij3} = the percentage of firm i 's total sales that are in three-digit market j
—is multiplied by the value of the variable in that market. These products are then summed over all SIC markets in which the firm participates. The following measures are calculated using these weights:

<u>Variables</u>	<u>How Calculated</u>	<u>Definitions</u>
Weighted market share	$SHARE_i = \frac{\sum_j m_{ij4} M_{ij}}{\sum_j m_{ij4}}$	M_{ij} = Firm i 's share in four-digit market j , 1977 ¹
Weighted industry return on assets	$PROF1_i = \frac{\sum_j m_{ij3} ROA_j}{\sum_j m_{ij3}}$	ROA_j = ROA associated with three-digit market j , 1975 ²
Weighted industry return on equity	$PROF2_i = \frac{\sum_j m_{ij3} ROE_j}{\sum_j m_{ij3}}$	ROE_j = ROE associated with three-digit market j , 1975 ²
4-firm concentration	$CON4_i = \frac{\sum_j m_{ij4} CON_{j4}}{\sum_j m_{ij4}}$	CON_{j4} = 4-firm concentration in market j , 1972 ³
8-firm concentration	$CON8_i = \frac{\sum_j m_{ij4} CON_{j8}}{\sum_j m_{ij4}}$	CON_{j8} = 8-firm concentration in market j , 1972 ³
20-firm concentration	$CON20_i = \frac{\sum_j m_{ij4} CON_{j20}}{\sum_j m_{ij4}}$	CON_{j20} = 20-firm concentration in market j , 1972 ³
50-firm concentration	$CON50_i = \frac{\sum_j m_{ij4} CON_{j50}}{\sum_j m_{ij4}}$	CON_{j50} = 50-firm concentration in market j , 1972 ³
Growth of firm's markets	$GROW_i = \frac{\sum_j m_{ij4} GR_j}{\sum_j m_{ij4}}$	GR_j = annuity measure of shipment growth (in dollars) in four-digit markets, 1972–76 ⁴

¹Economic Information Systems, 1977.

²News Front, 1977.

³U.S. Department of Commerce, Bureau of the Census, 1975.

⁴U.S. Department of Commerce, Bureau of the Census, 1977.

<u>Variables</u>	<u>How Calculated</u>	<u>Definitions</u>
Diversification in four-digit markets	$DIVERS4_i = 1 - \frac{\sum_j m_{ij}^2}{(\sum_j m_{ij})^2}$	— ¹

The denominators are added to these measures to accommodate firm sales data where percentage totals do not sum to one. With Economic Information Systems (1977) data, this is the case whenever any of a firm's sales are in foreign markets. Additionally, concentration data and growth data are available only for firms with manufacturing-based SIC codes, again resulting in summations less than one.

The following firm-level measures are taken from annual reports:

Average total assets	AVASSETS	=	$\frac{\text{Total assets 1975, 1976, 1977}}{3}$
Return on invested capital, firm average 1975–1977	ROIC	=	$\frac{\text{Net income after tax + interest}}{\text{Shareholders' equity + long-term debt}}$

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¹Economic Information Systems, 1977.

TOP LEVEL MANAGEMENT PRIORITIES IN DIFFERENT STAGES OF THE ORGANIZATIONAL LIFE CYCLE

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This research operationally defined three top-level management priorities and made some suggestions about these priorities' relative levels of importance across three stages of organizational life cycles. Two different studies, a field study and a simulation, were conducted concurrently. The findings support some specific hypotheses about relationships between priorities and life-cycle stages.

Recent research into organizational effectiveness has accomplished much in explaining and improving our understanding of this construct. Quinn and Rohrbaugh (1983) clarified the definition of organizational effectiveness as a multi-dimensional concept; other studies (e. g., Cameron & Whetten, 1981; Quinn & Cameron, 1983) identified contingencies that are related to the components of the construct. Studies that have attempted to explain how different components of effectiveness vary in importance in different stages of organizations' life cycles seem to have been fruitful. For instance, Cameron and Whetten (1981) used 18 simulated organizations to demonstrate how the criteria for effectiveness changed with the different developmental stages these organizations went through. Quinn and Cameron (1983), in a longitudinal case study, made specific hypotheses about the degrees of importance of four different dimensions of effectiveness to four separate life-cycle stages. The purpose of our research was to build on, replicate, and improve on these previous studies. Ultimately, we hope to begin to sort out the many competing notions as to what managers do and the many competing prescriptions as to what they should do in different stages of organizations' life cycles.

The specific purpose of our study was to empirically test, both in the laboratory and the field, the hypothesis that different stages of organizations' life cycles engender different priorities among top-level managers. These

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priorities manifest themselves as indicators of certain kinds of effectiveness. By focusing on top-level management priorities we tried to overcome two related problems that have plagued previous organizational effectiveness research. These problems are difficulty in determining management intentions (Campbell, 1977) and multiple levels of abstraction (Quinn & Rohrbaugh, 1983). In addition, by using a dual methodology we tried to overcome the external and internal validity problems that have exacerbated difficulties in previous research. In this research, one study looked at top-level management priorities and life-cycle stages in four simulated organizations; the other looked at the priorities of top-level managers from 27 electrical manufacturing firms that were classified in terms of three life-cycle stages. Scholars have argued that a multimethod triangulation approach like this can yield high validity and reliability (e. g. Jick, 1979; McGrath, 1964). In the section that follows we (1) define three categories of management priorities, (2) introduce a model of the stages of the organizational life cycle, and (3) describe the theories that have tried to link the two concepts.

REVIEW OF THE LITERATURE

Management Priorities

The concept of management priorities is not new to the organizational literature (e. g., Barnard, 1938; Taylor, 1911). Events reveal managers' priorities. Investigators can observe and measure these priorities by focusing on how top-level managers pay attention to, weigh, and actually use certain types of information available to them when solving problems. The type or content of the information reflects the priority. Many authors (e. g., Quinn & Rohrbaugh, 1983; Scott, 1977; Scott, Mitchell, & Newman, 1981; Seashore, 1979) have suggested that managers' priorities reflect what they desire and therefore provide indicators or criteria of effectiveness. These authors have typically described very similar effectiveness typologies with three or four core categories or priorities. For instance, each typology seems to contain an efficiency category (Quinn & Rohrbaugh, 1983; Scott, 1977); an administrative category (Quinn & Rohrbaugh, 1983; Seashore, 1979); and a political support category (Diesing, 1962; Scott et al., 1981). We will henceforth refer to these three categories as the technical efficiency priority, the organizational coordination priority, and the political support priority.

Although there has been general agreement that three or four major priorities constitute effectiveness, a close review of the literature reveals some overlaps among priorities and thus some disagreement as to how to define these categories. We chose to base the definitions of our three priority types on Deising (1962) because his definitions seemed to have the most in common with those of other authors and with our own conceptualizations. Deising prescribed the three priority types named in the preceding paragraph as means to obtaining different outcomes. In each case these outcomes were seen as beneficial or effective for both individuals and for their societies or organizations.

The technical efficiency priority is defined as concern for maximization of organizational efficiency. In this research we considered individuals to hold technical efficiency as a priority when they (1) were concerned with efficiency, (2) sought short term, quantifiable criteria for evaluating decisions, (3) sought high levels of accomplishment, and (4) held maximization of organizational efficiency as a personal value.

The organizational coordination priority can be defined as concern for the long-term integration of total organizations. In this research, we said that individuals held organizational coordination as a priority when they were concerned with cooperation and coordination, or integration, of their total organizations. These individuals were concerned with building organizational synergy. Since the process of coordinating total organizations and building organizational synergy requires both a total organizational-systems perspective and a long-term time outlook, we saw both of those factors as additional indicators.

The political support priority is defined as concern on the part of top-level managers for maintaining individual power and support and the commitment of subordinates. In this research, we considered individuals to have political support as a priority when they were concerned with maintaining the commitment and support of subordinates. These individuals were concerned with and interested in their subordinates' suggestions and attitudes. They were also interested in how subordinates accepted their decisions. In short, they were concerned with being fair and equitable to subordinates in order to obtain and maintain subordinates' support.

Stages in the Organizational Life Cycle

Models of life-cycle stages are also not new to the literature on organizations (Chandler, 1962; Haire, 1959; Mooney & Reiley, 1931). Haire was among the first to propose that the development of organizations may follow some uniform pattern. Chandler introduced stages to a life-cycle model in which he noted that as stages changed, so did firms' strategies and structures. The concept of modeling organizational life-cycle stages has recently grown in prominence in the literature (Abernathy, 1976; Galbraith, 1982; Greiner, 1972; Kimberly & Miles, 1980; Mintzberg, 1973; Scott, 1968; Summer, 1980).

Models of life-cycle stages presuppose that there are regularities in organizational development and that these regularities occur in such a way that the organizations' developmental processes lend themselves to segmentation into stages or periods of time (Scott, 1968). Although there are many different models, many contain common elements. Borrowing from many of the authors cited in the previous paragraph, we developed and operationally defined a three-stage life-cycle model for this research. Table 1 further describes this model, along with some organizational indicators.

Table 1 defines sequential stages of organizational development in matrix form. This matrix defines each stage in terms of key functional characteristics. Each characteristic has appeared in the literature in association with a particular pattern of indicators across the stages.

TABLE 1
Three Stages in Organizations' Life Cycles

Characteristics	Studies	Stage 1		Stage 2		Stage 3	
		Inception		High-Growth		Maturity	
Type of organizational structure	Schalon (1980) Abernathy (1976)	No formal structure		Centralized Formal		Decentralized Formal	
Reward system	Galbraith (1982) Scott (1971)	Personal Subjective		Systematic Impersonal		Impersonal Formal Totally objective	
Communication process and planning	Galbraith (1982) Scott (1971)	Informal Face-to-face Little planning		Moderately formal Budgets		Very formal Five-year plans Rules and regulations	
Formalization adherence	Scott (1971)	Low adherence		High adherence		High formalization but low adherence	
Method of decision making	Mintzberg (1973)	Individual judgment Entrepreneurial		Professional management Analytical tools		Professional management Bargaining	
Make-up of top level management staff	Galbraith (1982)	Generalists		Specialists		Strategists Planners	
Organizational growth rate	Galbraith (1982)	Inconsistent but improving		Rapid positive growth		Growth slowing or declining	
Organizational age and size		Young and small		Larger and older		Largest or once large and oldest	

At this point, it will be useful for readers to think about three distinct life-cycle stages. The first stage, organizational inception and mobilization, occurs when top-level managers think about building support from suppliers of resources and about getting their organizations going. The second stage, growth, occurs when top-level managers concentrate on managing the demands that expansion brings. Finally, the third stage, maturity, occurs when top-level managers garner support for the status quo or for restructuring organizations to allow new growth.

An Intregation of Stages and Priorities

The major purpose of our research was to ascertain in what ways management priorities covary with different life-cycle stages. From this perspective, our most conservative hypothesis was that changes in life-cycle stages will lead to changes in management priorities. However, a review of the relevant literature addressing this issue allowed us to make tentative hypotheses as to the relative degrees of emphasis managers place on each priority in the different stages. For instance, some scholars have argued that the technical efficiency priority is most important during inception stages because top-level managers need to build the support of important resource suppliers (e. g., Scott et al., 1981; Summer, 1980). Seen in this way, technical efficiency is a means to build and maintain support. According to such a theory, suppliers of resources lend support to new organizations on the basis of certain expectations about the new firms' future output and performance. For new organizations with limited track records, a typical performance measure is short-term quantitative output, at least until they accomplish some level of achievement. Managers under these circumstances would need short-term, results-oriented, quantitative priorities in order to ensure performance and maintain supplier support.

Scholars have also argued that technical efficiency is important in maturity when the rate of organizational growth slows (Adizes, 1979; Lyden, 1975). Under such circumstances, organizations deplete slack resources, and threats to management legitimacy may arise as resource suppliers consider withdrawing their support (Levine, 1980). Thus, as in the inception stage, managers focus on technical efficiency as a means to improve short-term performance and maintain support. However, this priority may also grow in importance with maturity as an outcome of increased formalization. In summary, we expected technical efficiency to be most important in the stages of inception and maturity, and less important in the intermediate stage.

Many authors have theorized that the organizational coordination priority becomes important as organizations experience high levels of growth that result in increased structural complexity (e. g., Katz & Kahn, 1978; Summer, 1980). As organizations evolve toward the stage of high growth, their structures grow. This expansion makes management of total organizations more complex, more difficult, and also more crucial than management at this level had been before. A failure in one part of a system could lead to a failure of

the whole system. So managers need to think about the long-term effects of their decisions on total structures and systems. Such a perspective is necessarily long-term because of the complexity of the interrelations and the systemic nature of the coordination task. Managers also must focus on whole organizations and systems rather than on particular problems or functions in order to achieve coordination and communication among various units. Thus, we viewed organizational coordination as a means of managing complexity brought on by growth and expected that as a priority it would be most important in the high-growth intermediate stages and less important in the stages of inception and maturity.

Finally, many authors have theorized that the political support priority becomes important as organizations' rates of growth slow, as they do in the mature stage of the life cycle (Scott et al., 1981). With maturity, a number of interrelated problems occur. First, as growth slows, organizations deplete their munificence or slack (Ford, 1980). This directly threatens their managements' legitimacy and, as noted earlier in this section, technical efficiency should become important. In addition, managers themselves view declining growth as indicating failure, so they strongly wish to change and realign their organizations to allow continued growth (Scott, 1976). Unfortunately, change may be most difficult at such times because managers lack legitimacy and slack resources. Under these conditions managers need to focus on being fair and equitable with subordinates to maintain their support. They are concerned with subordinates' attitudes and with how well subordinates accept their decisions, as tests of their legitimacy. They are also concerned with maintaining their influence and existing structures in order to implement change and prepare organizations for future growth. Thus, because it is a means of maintaining support and implementing change, we would expect political support to be a more important priority in mature stages than in earlier stages.

In summary, many authors have argued that managers' priorities differ at different stages of organizations' growth and development. Although it is extremely difficult to make precise predictions, it appears from the foregoing review that:

Hypothesis 1: Technical efficiency is more important at inception and maturity than it is at intermediate stages.

Hypothesis 2: Organizational coordination is more important at intermediate stages than it is at inception or maturity.

Hypothesis 3: Political support is more important at maturity than it is at earlier stages.

To empirically investigate the logic of these hypotheses, we conducted a field study of 38 top-level managers in 27 electronic companies and a laboratory simulation involving 32 managers in four simulated organizations concurrently. The next sections present the methods and results for each of these studies, and discussion and integration of the two.

THE FIELD STUDY

Top-level managers received a decision problem in the form of a scenario and then were asked to fill out questionnaires. The questionnaire sought to assess these managers' priorities regarding the scenario and also to gather data that reflected the present life-cycle stages of these managers' firms. On the basis of these data, we used cluster analysis to classify each firm as being in one of three stages. We then examined what priorities firms' managers emphasized at different stages.

Participants

Thirty-eight top-level managers (26 CEOs and 12 others) from 27 electronic manufacturing firms participated in this study. We randomly selected these firms from a sample of electronic manufacturing firms that we developed using location, SIC code,¹ and size distribution as criteria.

Procedures

This research used a resource allocation problem in the form of a scenario.² There were a number of steps involved in developing our scenario. First, we gathered preliminary information by interviewing the CEOs of nine electronic manufacturing firms. From these interviews we constructed a scenario describing a resource allocation problem that all the firms in the sample might realistically have to solve. Next, four faculty members, eight Ph.D. students, and three CEOs who were not participants in this study pretested the scenario and questionnaire. From the results of this pretesting we improved the realism of the scenario and the clarity of the questionnaire. Finally, using the final form of the decision scenario and questionnaire we gathered data for the study. We conducted structured interviews with 24 CEOs in addition to the original 9 CEOs who had provided preliminary information. During these interviews, we obtained commitments to participate in the study and fill out the questionnaire. In addition, we asked the CEOs to distribute questionnaires to other top-level managers in their organizations. We gave all participants copies of the coded questionnaire to fill out at their convenience and return by mail.

The Decision Scenario and Measurement of Priorities

The scenario described the decision problem in detail and told the managers they were going to have to make a decision about how a new product was to be developed. We asked the managers to assume that they had three folders of information on their desks and that each of these folders held different kinds of information. We provided no other definitions or labels for the folders, but simply told the managers that within each folder were five

¹ The SIC code we used was 3600.

² There are a number of benefits in using scenarios. For a complete discussion of these benefits and the procedure to be followed in developing scenarios, see Fredrickson and Mitchell (1984).

kinds of information. We constructed each of the three hypothetical folders to represent information that reflected one of the three priorities; for example, within one unlabeled folder were five kinds of technical efficiency information.

The managers were asked to evaluate the information in terms of how valuable each item would be in helping them make the resource allocation decision if it were to occur in their own organizations. More specifically, they were to distribute 100 importance points among the five kinds of information within each folder. After the manager had distributed importance points within each folder, they were asked to distribute 100 additional importance points among the three folders on the basis of which folders would be most important to them in making the decision. Finally, the questionnaire had two questions that sought to determine whether the decision scenario and kinds of information categories listed in the folders resembled real situations in which these managers might be involved.³

Measurement of Stages

The final portion of the questionnaire contained a number of questions that sought to assess the particular stage that each manager's organization was in. We used both this resulting information and information gathered from interviews and secondary data to classify organizations in terms of life-cycle stages.

The CEOs and other managers responded to a number of questions with Likert-type scales assessing the following dimensions: (1) formal structure definition, defined or undefined; (2) extent of adherence to formal structure; (3) type of structure, centralized or decentralized; (4) formality of communication system; (5) formality and objectivity of reward system; (6) adherence to reward system; (7) use of formal operating budgets; (8) time horizon of budgets and plans; (9) the make-up of top-level staff, generalists or strategists and planners; (10) method of top-level decision making, entrepreneurial or professional. Information was also gathered from interviews and secondary data on the firms' ages, sizes, and rates of growth. This data plus information from the scaled questions gave us 15 indicators of life-cycle stages. Table 1 further describes indicators.

RESULTS

Validity of Methods

Three issues of validity were of concern. First, we found no response bias among firms participating; managers from 27 out of 33 firms returned questionnaires for an 82 percent response rate. Next, within the 9 firms that provided multiple responses, managers' answers to the questions concerning stages of the life cycle showed high levels of agreement. On the average, α

³ Copies of the decision scenario and questionnaire are available on request from the first author.

= .96 across all stage questions within firms. Finally, over 85 percent of respondents indicated strong concern with the type of decision described in the scenario and high levels of using the types of information found in the questionnaire. This indicated strong face validity for the scenario and priority indicators.

Classification of Firms in Stages

The model described in the introduction suggested that there are three organizational life-cycle stages. Guided by this three-stage theory, we used cluster analysis to classify firms in terms of stage.⁴

First, since there was strong agreement among managers within firms on the questions on stage, we aggregated multiple responses from firms into organizational composite scores. Thus, we reduced 38 managers' responses to 27 organizational response scores.

As the preceding main section stated, information was gathered on 15 indicators of life-cycle stage, the stage-model indicators. Because there were high correlations between some of these indicators and because of the requirements of cluster analysis, the next step was to reduce the 15 indicators into factor scores by principal components analysis. The process yielded five principal factors representing organizational growth, maturity, structure, decision style, and formalization. The reliability of this technique is questionable, however, because of the small sample size ($N = 27$). Seeking complementary support for this reduction, we had three independent judges sort the 15 items into five groups and labeled these groups in terms of what the component items described (e. g., growth, maturity, etc.). This process appeared to validate the factor analysis. The judges sorted 84 percent of the indicators into the same categories that they were in according to the factor analysis.

Finally, using these factor scores, we classified organizations into three stage-of-life-cycle groups by a variety of cluster techniques. To measure pairwise similarity, we used the average within-linkage and average between-linkage methods (Sneath & Sokal, 1973) of clustering, as well as a correlation similarity matrix. Additionally, we used Ward's (1963) suboptimization method with distance measures to assess pairwise similarity. Under the three-stage model constraint, all three techniques yielded very similar results, indicating that these were reliable clusters. Statistical analysis comparing clustering techniques indicated that on all comparisons there was .000 probability that clusters produced by three different techniques would not be more similar than three randomly determined portions of the same sizes (average $z = 11.79$). In addition, Cohen's kappa, which measures similarity of clusters, showed strong similarity (.88). All clusters or groups were in themselves significantly different from optimal partitions of clustering of random data. As a result of these procedures, we classified 6 organizations as in stage 1, 13 as in stage 2, and 8 as in stage 3. Table 2 contains the mean scores across the 15 key dimensions for the three stages.

⁴ Everitt (1980: 6) claimed model fitting to be among cluster analysis' varied uses.

TABLE 2
Description of Sample and Clusters by Mean Scores

Measured Characteristic	Entire Sample (n = 27)	Stage 1 Inception (n = 6)	Stage 2 High Growth (n = 13)	Stage 3 Maturity (n = 8)
Growth rate in dollar sales	19.18%	6.0%	24.0%	20.6%
Growth rate in number of employees	12.72%	1.0%	17.0%	12.0%
Structure definition 1 = No structure 3 = Partial structure 5 = Very formal	3.701	3.167	3.769	4.438
Type of structure 1 = Decentralized 5 = Centralized	2.701	3.330	2.494	2.563
Extent of formal vs. informal communication 1 = Informal 5 = Formal	3.034	2.500	3.071	3.375
Extent of use of objective or subjective rewards 1 = Subjective 5 = Objective	3.688	3.500	3.660	3.875
Extent to which reward system is adhered to 1 = Never 5 = Always	4.216	4.500	3.987	4.375
Extent to which structure is adhered to 1 = Never 5 = Always	3.910	4.000	3.770	4.100
Extent to which budgets are used 1 = Never 5 = Always	4.395	4.000	4.359	4.750
Time horizon of budgets and plans 1 = ¼ year 3 = 1 year 5 = 5 years	2.846	2.000	3.103	3.063
Type of decision making 1 = Professional 5 = Entrepreneurial	3.231	4.167	2.904	3.063
Breakdown of top level staff				
Generalists	21%	45%	15%	14%
Specialists	51%	31%	58%	54%
Strategists	26%	22%	26%	31%
Organization's age in years	17.0	11.0	17.0	20.6
Organization's size in dollars ^a	48.3	0.8	82.0	28.0
Organization's size in number of employees	674	14	1066	532

^a Millions of dollars.

Analysis

The design of the questionnaire allowed us to analyze priorities at two separate levels. We could look at the importance values⁵ assigned to each of the 15 information items and at the importance values assigned to each priority or folder. We took the second approach in our initial test of the theory presented earlier in this paper because it directly reflected the three priorities. We used a MANOVA to assess the differences across stages and found significant differences among the three priorities of top-level managers ($F = 2.36, p < .014$). That is, managers assigned the three priorities different importance weights as a function of stage of organizational life cycle. Since there were overall differences across stages at the multivariate level, we tested each of the three priorities separately to assess the degrees and directions of differences.

On the basis of the classification of organizations described earlier in this section, the differences in the technical efficiency priority across the three stages failed to reach significance ($F = .143, p < .867$). Technical efficiency was important to all three stages and appeared to increase in importance with maturity. The differences in the overall coordination priority indicated a significant decrease in importance between stage 1 and stage 3 ($F = 3.663, p < .036$). Finally, the differences in the political support priority were also significant and showed increasing importance between stage 1 and stage 3 ($F = 2.506, p < .096$). Figure 1 depicts the relationships among the three priorities and the three stages.

An overview of this figure suggests that priorities clearly change with stage for organizational coordination and political support, but that technical efficiency stays relatively important across all three stages. Although results generally supported the notion that priorities differ across stages, they did not clearly support our specific hypotheses as to the directions of changes. However, before discussing these data in more detail, we will present the data from our organizational simulation, and then try to integrate the findings of the two studies.

THE ORGANIZATIONAL SIMULATION

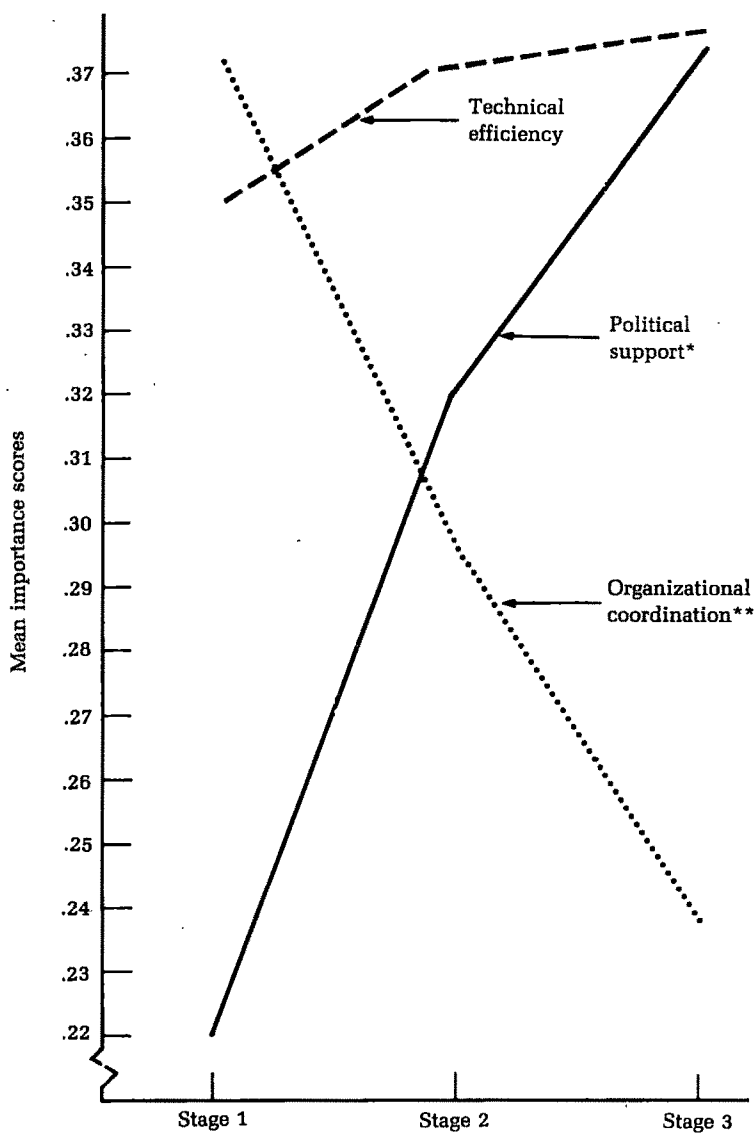
Procedures

A research setting was sought that would allow for the simulation of different stages of organizational life cycle. Many authors have argued for the use of simulations in studying the dynamics of behavior in organizations (e. g., Cangelosi & Dill, 1968; Neal, 1978; Weick, 1965). We chose Miles and Randolph's (1979) *Organizational Game*⁶ as our research vehicle because its developers and other investigators have used it successfully in their research (Cameron & Whetten, 1981; Miles & Randolph, 1980). In addition, pretests of

⁵ There were three importance values based on the five information items available in each folder.

⁶ See Miles and Randolph (1980) for a complete description of the game.

FIGURE 1
Plot of Mean Importance Scores for the
Three-Priority Model by the Three Life-Cycle Stages



* $p < .096$

** $p < .036$

the game revealed that the simulated organizations experienced developmental stages similar to real organizations.

Sample

The 128 students who participated in the overall study were from four class sections of an undergraduate senior-level business policy course. We selected and assigned 32 students from these four class sections to four different runs of the simulation. We then randomly assigned each set of 8 students within each of the resulting hypothetical organizations to management roles. These department managers served as the sample for this study. All the participants thought the game was to last 16 hours; we terminated the game after 12 hours so that no unique end-session behavior would occur.

Measurement of Stages

The central feature of the *Organizational Game* is that it simulates different stages of the organizational life cycle (Miles & Randolph, 1980). We used time, measured in terms of how many game sessions participants experienced, as a surrogate for specific stages. Sessions lasted 45 to 75 minutes. Pretesting of the game indicated that ten operating sessions was a good number for sustaining participants' involvement. In addition, even though we believed in a three-stage life cycle, each of two pretested organizations appeared to go through four stages. The first stage, which lasted through sessions 1 and 2, was organizational start-up. The second stage, which lasted through sessions 3, 4, and 5, brought mobilization and turnaround. The third stage, which lasted through sessions 6 and 7, saw growth in resources and performance indicators. Finally, there was a period in which growth slowed. Given these pretests, we decided to measure priorities at four points in time in order to assess the effects of each of the different stages.

Design

This study used a repeated measure design. We collected data after game sessions 2, 5, 7, and 10. In addition, in order to test for any pretest effect, we collected data from a control group only after session 10. Comparison between the responses of the control group and the managers gave some indication of whether any pretest effect occurred.

Measurement of Priorities

Department managers within each simulated organization responded on four occasions to five questions. Forced-choice questions measured priorities. The questionnaire asked managers to indicate how much emphasis each priority received during the previous game session. Three of the questions asked them to distribute up to 100 importance points to indicators of all three priorities: technical efficiency, organizational coordination, and political support. Two additional questions asked managers to distribute 100 points between only technical efficiency and organizational coordination indicators. With this questionnaire design, there were five measures of these two

priorities, and three measures of the political support priority. Figure 2 presents the actual indicators.

RESULTS

Analysis

First, there were no significant differences between the members of the control group and the managers on any of the dependent variables. More specifically, one weakness of a repeated measures design is that repeated exposures of the subject to a questionnaire can create a response bias, often referred to as a pretest effect. Since no differences occurred, we can probably assume there were no pretest effects and that status did not confound results.

Next, a 4×4 (stage \times organization) MANOVA with 13 dependent variables⁷ was developed to investigate any effects that might be due to differences among the four organizations. This analysis revealed that none of the dependent variables were significantly different across the four organizations ($F = 0.39$, $p < .29$). We therefore pooled responses across the four organizations.

Finally, we wanted to see if any of the 13 dependent variables varied significantly across the simulated life-cycle stages, as our theory suggested. At the multivariate level of analysis there was a significant effect for stage ($F = 7.34$, $p = .00$). Given these significant results, we proceeded to test each dependent variable using a one-way ANOVA with the four stages as our independent variable.

Figure 2 shows the managers' degrees of concern for efficiency over the four stages for five different measures. All five measures differed significantly across stages. Managers initially spent their time working within their departments; they also were initially concerned with goal attainment and cash reserves and held short-term time perspectives. Technical efficiency generally declined in importance as a priority during the middle stages. Concern with this priority then increased during the later stages. The findings indicate the relationship between concern for technical efficiency and life-cycle stages to be curvilinear.

Figure 2 also shows the managers' degrees of concern for organizational coordination as measured by five indicators. All five measures supported the notion that the importance of this priority changes over time. During initial stages, concern for this priority was low, but as organizations developed, organizational coordination increased in importance for managers. Managers spent more time working between departments; they showed increased concern for long-term thinking, increased concern for interdepartmental coordination, and increased concern for the performance of their total organizations. Finally, with maturity, this priority declined in importance.

⁷ Five referred to technical efficiency, five to organizational coordination, and three to political support.

Figure 2 also shows managers' degrees of concern with political support as measured by three indicators. Results showed that all three indicators grew in their importance to managers as organizations matured. Managers showed increased concern for maintaining their existing organizational membership structures. They also showed increased concern for having subordinates accept decisions and for fairness to subordinates. However, the relationship between stage and this priority was not linear but curvilinear. Political support priorities were a major concern to managers in early stages of organizational development as well.

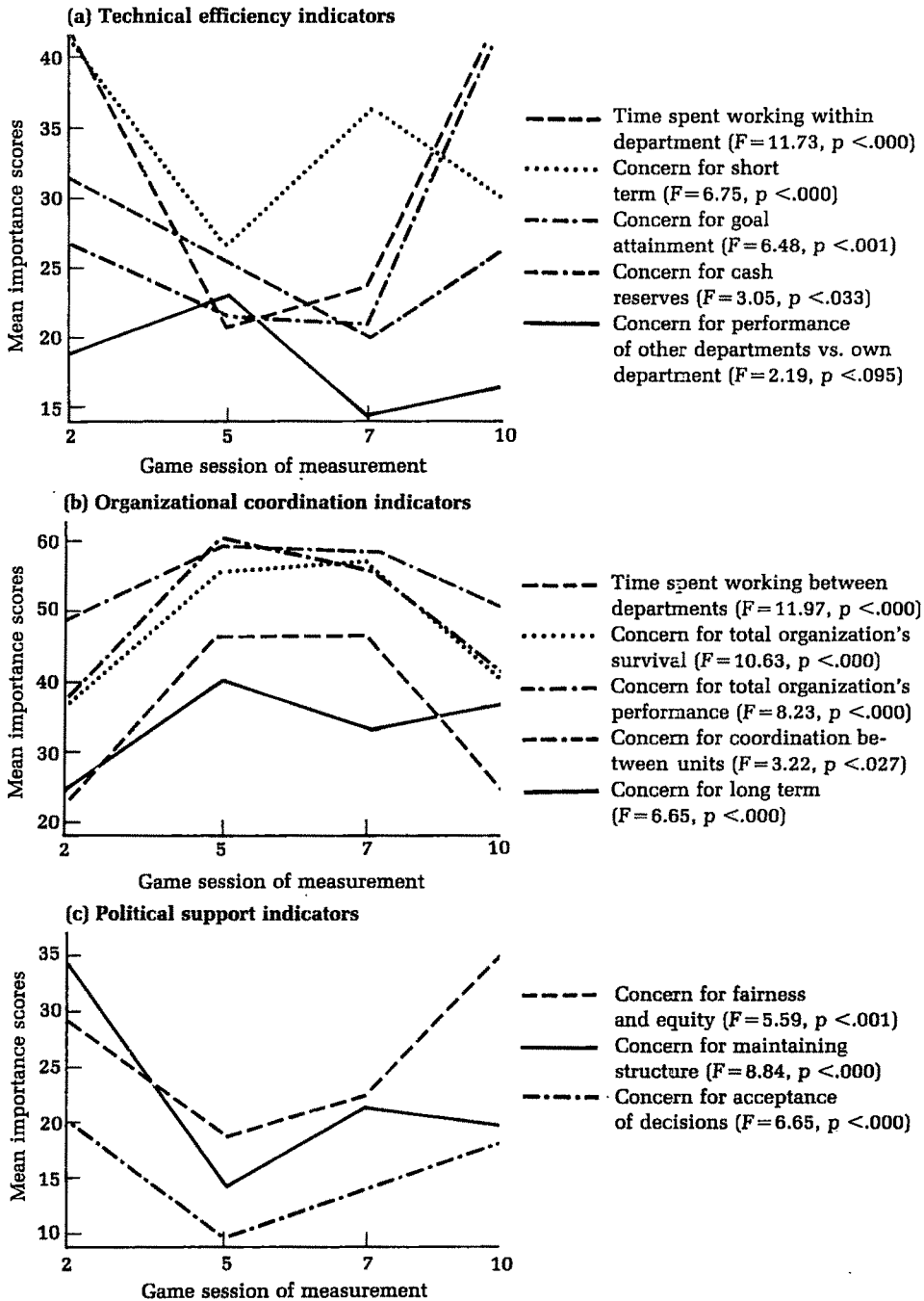
DISCUSSION AND INTEGRATION

First, the results of both studies supported our conservative hypothesis: priorities differ in different stages. Second, both yielded evidence that managers' concern with political support changed as organizations developed through different stages. In addition, the simulation gave evidence that organizational coordination gained its greatest importance in the middle stages. However, the field study offered only limited support for that relationship; in the field study, this priority decreased in importance in later stages. Finally, only the simulation supported Hypothesis 1, that technical efficiency is more important at inception and maturity than in intermediate stages. The divergence of results between the two studies is a major concern; we had hoped that the dual method of testing would yield convergent results. However, before further comparison of the results of the two studies, we should ascertain that the variables used in them were roughly equivalent.

In order to test the similarity of the priorities' indicators across the two studies, we had three judges sort all the different indicators—15 for the field study, 13 for the simulation—into three categories based on some relatively general definitions of the constructs. The judges sorted 90 percent of the indicators into the appropriate priority categories; for instance, they put concern for cash flow under technical efficiency. We could thus reasonably conclude that the priority constructs were generalizable across settings.

As with the priorities, operational definition of the life-cycle stages differed across studies. These differences were somewhat problematic in that the simulations had four stages, as pretesting had suggested, but the field study had three stages, as previous theory had suggested. To align the three stages from the field study with the equivalent three stages from the simulation, we made a number of qualitative comparisons. The results of these comparisons indicated that the simulation's stages 2, 3, and 4 matched up reasonably well with the field study's stages 1, 2, and 3. For example, stage 3 of the simulation was one in which each organization experienced its highest growth in performance indicators, beginning structural decentralization, increased use of formal budgets, and beginning formalization of many procedures; firms from the field study that were in stage 2 experienced many of these same conditions. For example, these firms experienced their highest growth rates in stage 2.

FIGURE 2
Plot of Mean Importance Scores for 13 Indicators
of the Three Priorities by the Four Points of Measurement



In stage four of the simulation, growth in performance indicators slowed; formalization increased still further, bringing, for instance, formal report writing; organizational structures were clearly defined; and managers acted very much like professional managers. These conditions were similar to those experienced by stage 3 firms from the field study; the majority of the stage 3 firms in the field study experienced decreased growth rates.

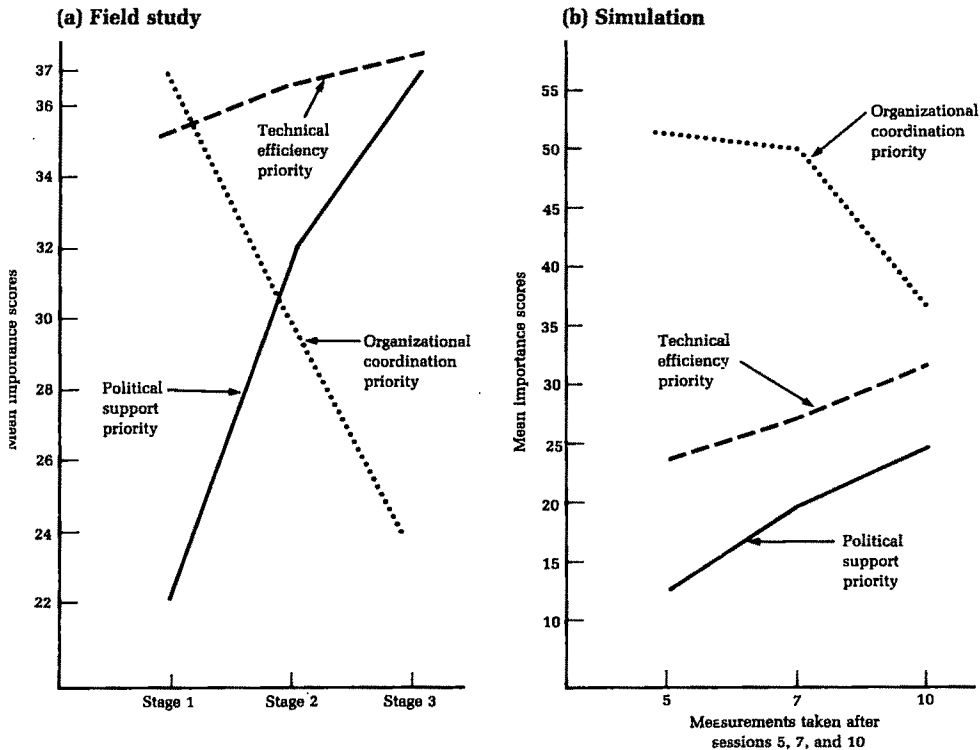
Finally, stage 2 of the simulation matched up well with stage 1 in the field study. The simulated organizations in stage 2 characteristically experienced turnarounds in which they showed their first slow but positive growth. In this stage these simulated organizations also used centralized structures in which managers made all the decisions. These conditions were similar to those for stage 1 in the field study, in which, for instance, firms experienced slow, positive, initial growth.

In summary, analysis of data suggested that life-cycle stages 2, 3, and 4 of the simulation matched up reasonably well with stages 1, 2, and 3 in the field study, as mentioned earlier in this section. We could make no meaningful comparisons with stage 1 of the simulation because no firms in the field study were start-ups. Given these matches, we could begin to compare the results from the two studies. To make these comparisons, we averaged all the simulation's priority indicator scores across all questions for each priority into composite scores. We left out data from the initial (stage 1) sessions. Each resulting composite score is for one of the three priorities for game sessions 5, 7, and 10, which represent stages 2, 3, and 4. We compared these data with data from the field study, using the three-priority model depicted in Figure 1. Figure 3 shows this comparison.

This comparison generally revealed similarity in the directions of changes. More specifically, in both studies, the importance of the political support priority increased as organizations advanced through the stages. Top-level managers whose firms are mature focus more on their subordinates' commitment, morale, and opinions when they make decisions than their counterparts whose firms are in earlier stages do. Also, these managers are more concerned with maintaining present structures of relations. At first glance, this finding appeared to contradict those of Cameron and Whetten (1981). They concluded that input criteria or focus on gaining support decreased in importance with maturity. However, because their findings were based on simulations that had only five sessions, while ours had ten sessions, their final stage was our middle stage. In addition, our findings resemble those of Quinn and Cameron (1983), who argued that maintaining control, the essence of the political support priority, was an essential priority in mature stages.

In both studies the importance of the organizational coordination priority decreased in later stages. This suggests that top-level managers are less concerned with issues of coordination, integration, and synergy when their firms mature. The long-term effects of their decisions also become less important to these managers. Again, this finding resembles Quinn and Cameron's (1983) finding that an open-system model of effectiveness, which is very

FIGURE 3
Comparison of Results^a from Simulation, without Session 2
Measurement, with Field Study Results, Three-Priority Model



^aMean scores represent averages of all indicators for each type of priority.

similar to our organizational coordination priority, is most important in early stages and that it is a prerequisite to effectiveness as measured by other models. That is, these authors have argued that the organizational coordination should be the first management priority in early stages if these organizations are to survive. Despite this consistency with previous research, we did not find the curvilinear relationship we hypothesized. Specifically, the simulation data for stage 1 revealed that organizational coordination was not as important as technical efficiency and political support. Perhaps if start-up organizations a few months old had figured in the field study we would have found support for the curvilinear relationship found in the simulation.

Figure 3 also reveals that technical efficiency increased in importance in later stages in both studies. This finding is also similar to Quinn and Cameron's (1983) conclusion that goal accomplishment, productivity, and efficiency are most important in later stages. Unfortunately, because of the

nature of our field sample, we could not assess the extent to which technical efficiency is important during the earliest stage. Findings from the simulation indicated that this priority was important at that time.

The findings also lend insights as to the priorities' relative degrees of importance. For example, it seemed that short-term, quantifiable economic considerations were always important to managers who participated in the field study; these considerations fell under the technical efficiency priority. Summer (1980) suggested this finding. In contrast, managers from the simulated organizations were generally more oriented toward organizational coordination than toward either of the other two priorities. This makes sense, because these were new organizations, emphasizing getting organized. On the other hand, our field-study firms had been up and running for years, and thus technical efficiency should have been more important than organizational coordination.

Like much exploratory research, the two studies independently raise more questions than they answer. But herein lies the usefulness of dual methods, which permit the strengths of one design to complement the weaknesses of the other. For example, the principle weaknesses of the field study were its cross-sectional classification system and lack of control. The significant changes found could be due to many exogeneous variables. However, the central strengths of the simulation were its repeated-measures longitudinal design and tight control. The same managers changed priorities across the simulated stages, and most exogenous variables, like performance, task, and environment, were controlled. Likewise, the field study can offset the simulation's lack of generalizability. Therefore, to the extent that the two independent studies yielded similar information as to changes in priorities, we can conclude that such changes were likely the results of changes in organizations' life cycles.

IMPLICATIONS AND CONCLUSIONS

One implication of this study is that academicians should be cautious about making prescriptions about what top-level managers' priorities should be, and that they should make such prescriptions contingent upon the life-cycle stage that focal organizations are in. This result is particularly important in light of the fact that scholars have developed much of our current theory by studying large mature organizations. Furthermore, our findings are predictive and give some indications of which priorities managers use across the three stages studied. However, we must be quick to point out that these data are descriptive, not normative. We have no way of knowing from our results whether emphasizing a particular priority during a particular stage was the most effective thing to do.

Another implication concerns the ease with which managers can change their priorities as their organizations reach different stages. During the laboratory study, the same managers changed priorities over time. However, Wieck (1979) and others have argued that managers view problems in light of past

experiences; and Chandler (1962) found that management changes often accompany organizations' transitions from one stage to another. It may be that managers, once they have developed a set of priorities that they find successful, find it difficult to change these priorities as circumstances change. Our findings imply that managers probably need to change their priorities as their firms move through different stages. If they cannot, they may inhibit the further development of their organizations. Obviously, further work on this question is needed.

The value of this research lies (1) in its verification of the existence of differing priorities across different stages of development and its descriptions of these priorities, and (2) in our tentative suggestions as to the priorities' relative degrees of importance over stages. In this regard, the findings both reaffirm and call into question previous research. Future research might fruitfully explore the extent to which intentions lead to particular organizational outcomes—that is, does emphasis on technical efficiency lead to a high efficiency ratio, does emphasis on coordination lead to highly coordinated systems, and so forth? Further research might also explore the extent to which such outcomes are or are not good for the health of organizations.

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EFFECTS OF DECISION MOTIVE AND ORGANIZATIONAL PERFORMANCE LEVEL ON STRATEGIC DECISION PROCESSES

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Managers make strategic decisions in response to both problems and opportunities, and when their firms are performing poorly or well. This research investigated effects of these two motives and of organizational performance level on strategic processes. Results indicated that variation in these factors affected the decision processes recommended by relatively inexperienced managers, but not those recommended by experienced executives. These two groups recommended very different processes for making the same strategic decisions, and the executives' approaches were simultaneously rational and intuitive.

Many management scholars believe that the process used to make strategic decisions affects the quality of those decisions. However, several authors (Bourgeois, 1980; Cosier, 1981; Mintzberg, 1978) have observed a lack of research on the strategic decision-making process. Empirical tests of factors that have been hypothesized to affect the way that strategic decisions are made are notably absent. For example, theorists have suggested that managers make strategic decisions differently when responding to problems rather than opportunities. Organizational performance level—poor or excellent—has also been posited to affect strategic decision making. This paper reports the results of two studies that attempted to assess the effects of decision motives and firms' performance levels on the strategic decision-making process.

THEORETICAL BACKGROUND

Strategic Decisions

In describing organizational decision making, several authors (Ansoff, 1965; Mintzberg, 1979) have presented hierarchies in which strategic decisions occupy the highest levels. Such decisions are generally nonroutine, but their most distinctive characteristic is that they commit significant resources, or set important precedents (Mintzberg, 1978; Narayanan & Fahey,

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1982). If decisions are commitments to act, strategic decisions are those that commit firms to actions that will have significant effects on their long-term performance.

Strategic decision making is a topic that has fluid boundaries. It is not possible to isolate certain decisions—on entering new markets or building new plants, for instance—and say that they are always strategic. Shirley (1982) recently argued for such an approach, but adopting it ignores the contingent nature of strategic decisions. As Mintzberg has stated, “no decision is inherently strategic; decisions are strategic only in context. The decision to introduce a new product is a major event in a brewery, but hardly worth mentioning in a toy company” (1979: 60). Thus, the primary task for strategic process investigators is to try to discern patterns in the complex process that produces decisions that have long-term consequences.

Decision Processes

Many authors have provided models of the decision processes of individuals, groups, and organizations. Simon's (1965) three-step characterization of organizational decision making—intelligence, design, choice—is a well-known example. Although all extant models have their own peculiarities, in many respects they are very similar (Lang, Dittrich, & White, 1978). For example, all of them, including the strategic process model presented by Mintzberg, Raisinghani, and Theoret (1976), begin with the sensing of a stimulus or motive. In addition, those authors and others (Dutton, Fahey, & Narayanan, 1983; Lyles & Mitroff, 1980) have argued that initial actions are critical because they shape what is done throughout the decision process.

As indicated in the preceding paragraph, decisions are usually characterized as being motivated by stimuli. For example, much of the early work on organizational decision making (Cyert & March, 1963; March & Simon, 1958; Simon, 1965) argued that managers' perceptions of problems motivated such processes, and that managers acted only when their organizations departed from some status quo. Similarly, other authors have suggested that problems motivate strategic-level decisions (Aharoni, 1966; Ansoff, 1965; Steinbruner, 1974). However, more recent contributions have suggested that the process of making strategic decisions may also be motivated by proactive, opportunity-seeking behavior or by the personal interests of dominant coalition members. Mintzberg and colleagues (1976) acknowledged this most recent view by characterizing strategic decisions as ranging on a continuum from exploitation of opportunities to reaction to problems and crises.

Effects of Decision Motive

Does an unexpected drop in sales warrant an analysis of current product lines, or does it reflect an aberration that is of little consequence? Does the interest of a major customer in doubling its purchase volume warrant an immediate increase in productive capacity, or does it call for detailed study? These are the kinds of questions that managers must answer when their organizations face problems or opportunities; true crises rarely allow the

luxury of such reflection. Several authors have argued that the decision processes that managers employ in response to problems are very different from the processes that are motivated by opportunities.

Situations that require strategic decisions are seldom perfectly formulated when they come before managers (Mintzberg et al., 1976). Therefore, except in crises that demand immediate responses, managers can exercise some discretion as to what process actions to take. The magnitude of the motivating force will affect what is done (Aharoni, 1966), as will the label that is initially placed on it (Dutton et al., 1983). Mintzberg and colleagues (1976) observed that managers most frequently meet problems with process actions intended to be comprehensive and rational, but respond to opportunities without using formal, analytical decision aids. People often assume that opportunities, with their favorable connotations, can simply be exploited.

Why do problems and opportunities motivate different decision processes? One explanation might be that decision makers initially characterize decision motives as having either positive or negative effects. For example, managers expect motives that they characterize as problems to have negative effects on their organizations. Therefore, subject to their own cognitive limits and their organizations' resource limits, managers faced with problems are likely to conduct analyses, search widely for information, and generally engage in activities intended to be comprehensive. To not do so would be to ignore the apparent negative consequences of the motivating force.

In contrast, managers expect decision motives that they characterize as opportunities to have significant positive effects on their organizations. Decisions motivated by opportunities do not provide critically needed solutions. On the contrary, simply responding to these stimuli promises previously unexpected benefits. Therefore, it appears that managers would tend to simply exploit opportunities without conducting analyses, searching widely for information, or otherwise taking actions intended to be comprehensive. This phenomenon may help explain why, over a period of years, executives make seemingly casual decisions to enter businesses that appear to be opportunities, only to discover that those decisions have unexpected consequences for their firms.

Thus, the first hypothesis this study tested was:

Hypothesis 1: The actions taken in making strategic decisions that are motivated by problems will be more comprehensive than those taken in response to opportunities.

Effects of Performance Level

Other contextual variables may also shape strategic decision processes. Strategic management and organization theory scholars have posited level of organizational performance as an influence on how strategic decisions are made. For example, Hambrick and Snow (1977) presented a model in which a firm's current and past performance affects the strategic process. Similarly, the strategy formulation models offered by Ansoff (1965) and by Hofer and Schendel (1978) also incorporated the effects of performance. However, these

effects are not well understood or articulated, and "little evidence exists regarding the effects . . . of performance on strategic decisions" (Hambrick & Snow, 1977: 11).

Organization theorists generally use the term organizational "slack" when discussing effects of performance. High levels of performance provide resources beyond what firms need to pay suppliers, attract employees, or otherwise engage in basic business, and those excess resources are called slack (Bourgeois, 1981: 30). On the other hand, poor performance does not generate excess resources and at its extreme does not even provide the minimum needed to stay in business. Previous researchers have argued that slack resources allow organizations to maintain stability through intermittently good and bad times (Cyert & March, 1963) and to retain structures that are not optimal (Litschert & Bonham, 1978); slack also may facilitate creative behavior (Bourgeois, 1981).

What is of interest here is the effect that slack, a product of organization performance, has on strategic decision making. Cyert and March (1963) argued that increased slack decreases the intensity with which organizations will "search" for information. This argument is consistent with those presented by other authors (Bourgeois, 1981; Litschert & Bonham, 1978) who have suggested that slack resources allow organizations to make strategic decisions that are "satisficing" (March & Simon, 1958: 169) and less than optimal.

It appears that there is an odd dichotomy in the relationship between organizational performance and the actions that managers take in a strategic decision process. On the one hand, a high level of performance produces resources that make it possible to make decisions based on actions like extensive information search and elaborate analyses. However, firms usually do not use slack generated by excellent performance to pay the costs of seeking optimal solutions; instead resources are absorbed as suboptimal decisions are made. This phenomenon may help explain why managers in historically successful firms sometimes make a series of what appear to be inadequately considered, intuitive decisions that in combination have significant negative consequences.

In contrast, poor performance puts pressure on management to make precise, discriminating decisions (Cyert & March, 1963). Therefore, because they have less margin for error than their counterparts in firms with good performance, managers in such firms may have strong incentives to be comprehensive in making strategic decisions. Managers of poorly performing firms may hire consultants, contact others in their industries for advice, and conduct detailed financial analyses, to mention just a few possibilities. They take such actions with hopes that their decisions, and ultimately their firms' performance levels, will improve.

The preceding arguments suggest the second hypothesis that was tested:

Hypothesis 2: The actions taken in strategic decision-making processes of firms that are performing poorly will be more comprehensive than those taken in firms whose performance is excellent.

METHODS

Overview

In order to test the stability and generalizability of the hypotheses, two studies were conducted, the first with a group of M. B. A. students and the second with upper-middle level executives. In both studies, participants read cases that described firms faced with major decisions and recommended actions for the firms to take in making those decisions. Cases had either problems or opportunities as decision motives, and the firms' performance was either poor or excellent. Participants' responses were scaled from noncomprehensive to comprehensive, or the reverse. Recommended actions were then analyzed by multivariate analysis of variance (MANOVA) for main effects and for interactions between decision motives and performance levels.

Instruments

Two cases were used to decrease the likelihood that subsequent results would be peculiar to a given decision. Each case was three pages long and began with a paragraph of background information on the hypothetical firm, including line of business, sales volume, and number of employees. In one case, the firm, Northeast Manufacturing, was a manufacturer of electrical components whose management had to decide whether to commit \$1.4 million to make major modifications in its manufacturing facilities. In the other case, the firm, American Products, was a producer of consumer products, and its management faced a decision of whether to spend \$2.0 million to develop a line of new products. The expenditures under consideration represented the same percentage of total sales in each case.

Manipulating independent variables. The independent variables were manipulated by inserting in the cases one of two alternative paragraphs describing the decision motive as a problem or as an opportunity, and one of two describing performance level as poor or as excellent. Therefore, four combinations of conditions were possible for each of the two cases.

The content of the paragraphs conveyed the manipulation of decision motive in two ways: labeling and the sign of expected effects. For example, for the problem condition, the heading that preceded the paragraph in which the motive was discussed was "The Problem," and the first sentence concluded with the statement that management "was faced with an unusual problem." In the Northeast Manufacturing case, the next sentence stated that a decision to modify existing manufacturing facilities was under consideration since "a multiyear contract worth \$9.5 million in annual sales might be cancelled because Northeast was not able to meet quality and volume requirements."

To complete the manipulation, the text also specified whether the motive's expected effect was positive or negative. Problems are expected to have negative effects, so in that condition the next paragraph indicated that

losing this contract would produce "an immediate decrease in sales and market share, which would encourage competitive inroads." It would also be likely to decrease the flexibility of the manufacturing process, reduce material yields, and increase per unit costs, consequences that would combine to decrease margins and profits. In addition, the paragraph suggested that losing the contract would decrease the likelihood of selling this customer other products, and could also prevent future cooperative ventures.

The instrument likewise established the opportunity condition by labeling the motive and specifying whether positive or negative effects were to be expected. Label and sign were of course the opposite of those characterized for problems. For example, the heading preceding the motive paragraph was "The Opportunity," and the first sentence concluded that management "was faced with an unusual opportunity." In the opportunity condition of the Northeast Manufacturing case, the second sentence indicated that management was considering the decision because they had been "approached by one of the firm's existing customers with an order that would double the customer's purchases for the next several years, an increase of \$9.5 million annually." Note the contrast between the two motive conditions: losing an existing contract worth \$9.5 million annually versus gaining a new one for the same amount.

As for the expected effects of decision motive, in the opportunity condition the Northeast case indicated that being able to accept the order would produce "an immediate increase in sales and market share, which would discourage competitive inroads." The text went on to indicate that being able to accept the order would increase manufacturing flexibility and material yields, and decrease per unit costs, which would combine to increase margins and profits; furthermore, it stated that being able to accept the order would increase the likelihood of selling this customer other products, and could also lead to cooperative ventures in the future. Manipulation of decision motive in the American Products case was similar.

The second manipulation, concerning performance levels of the hypothetical firms, was also accomplished in two ways. Again, labeling was one means; for the poor performance condition the first sentence of the case concluded that "even though Northeast had experienced many successes since its founding in 1957, its recent performance had been poor." The second performance manipulation was accomplished by varying—above or below—the firm's performance on numerous measures relative to industry averages. In the poor performance condition, the paragraph explained that during the past four years the firm's stock price had fallen by 75 percent, in large part because "returns on assets and equity [that] averaged 8 and 9 percent, respectively, compared to 15 percent on assets and 17 percent on equity in their industry." In addition, the case pointed out that during the same period net income had averaged 4 percent of sales compared to the industry's 8 percent, because sales had grown at only 5 percent annually, instead of the industry's 10 percent.

Labeling also established the excellent performance condition, with the first sentence indicating that Northeast "had experienced many successes since its founding, and its recent performance continued to be excellent." Moreover, numerical data established the firm's performance to be above its industry's average by the same amount that it was below average in the poor performance condition. For example, Northeast's stock price was characterized as having risen by 75 percent during the most recent four years, largely because "returns on assets and equity had averaged 22 and 24 percent, respectively, compared to the industry's 15 percent on assets and 17 percent on equity." Similarly, net income had averaged 12 percent of sales compared to an 8 percent industry average, which was attributed to sales growth of 15 percent annually that exceeded the industry's 10 percent rate. The performance manipulation in the American Products case was similarly accomplished.

Illustrating dependent variables. Following the paragraphs that included the motive and performance manipulations were several paragraphs in which managers expressed differences of opinion about how to make the decision. This was an attempt to increase respondents' involvement by suggesting that the situations were controversial. Moreover, because cases presented two sides of each controversy, they made respondents aware of the kinds of choices they would face in making their recommendations, but without biasing those recommendations. The instrument contained the same paragraphs in both cases, for all motive and performance conditions. These paragraphs also set the tone for the questions that measured the dependent variables.

This last section of the case began by stating that there was disagreement among managers as to what further steps, if any, they had to take before deciding whether to modify their manufacturing facilities (Northeast Manufacturing) or to develop a new product line (American Products). The text characterized some managers as believing "that the decision should be studied more to determine if all expected benefits could be realized." However, "others felt that the cost of further study and delays was not warranted."

After discussing these disagreements, the final paragraph pointed out that even those members who favored further study could not agree on what actions should be taken. More important, the paragraph provided examples of actions on which there were differences of opinion; the participants were later asked to make recommendations regarding these actions. One example pointed out that some managers were concerned over the number of people who needed to be "directly involved in the decision process, the areas of expertise that should be represented, and whether the decision could be judged solely on its own merits as opposed to being consistent with other decisions that were being considered." Similarly, the case suggested that there were concerns over (1) whether additional information should be sought from outsiders like consultants or customers, (2) how much formal analysis to conduct, (3) how much out-of-pocket expenditure to authorize, and (4) whether to create a special committee with primary responsibility for direct-

ing the decision making process. Finally, the case ended with a statement by the firm's president to the effect that the decision process could not be prolonged indefinitely.

Measures

After they read a case that contained one of the four possible combinations of decision motive and organizational performance level, participants responded to a series of Likert-type scaled questions. Instructions for the Northeast Manufacturing case told them to indicate what they "would do to decide whether to modify their manufacturing facilities." Participants were also told that "there are no right or wrong answers," and were asked to specify the answer "that BEST conveys your understanding and recommendations."

The first two questions were manipulation checks. For example, the first stated that "the available information indicates that [Northeast's or American's] recent performance has been . . .," and provided a response continuum from 1, extremely poor, to 7, extremely good. Similarly, the second question assessed participants' understanding of the decision motive. For example, in the opportunity condition of the Northeast Manufacturing case, respondents were asked whether "the customer's interest in doubling its purchases for the next several years" was clearly an opportunity, 1, or clearly a problem, 7. For the problem condition they were asked whether "the possibility of losing the multiyear contract is . . .," and offered the same continuum. The two cases contained similar questions.

The items that assessed participants' recommended actions came from two previous field studies (Fredrickson, 1984; Fredrickson & Mitchell, 1984) in which they had served as indicators of how comprehensive organizations were in making and integrating strategic decisions. These studies defined comprehensive actions as attempts to be exhaustive or inclusive. Five experts had selected the 22 questions used in the previous studies as the best of many questions designed to distinguish between comprehensive and non-comprehensive actions. For some questions these experts also ordered—from least to most comprehensive—the actions that served as alternative responses.

The present research used 10 of the 22 questions from the earlier studies in modified form. Those selected had consistently discriminated between firms, and they included seven single-response questions and three multi-item composites. The Appendix lists these questions. Each single-response question required a choice between two actions that the previous studies had presented as the least and the most comprehensive of five or six alternatives. In the present studies the first action was presented as the preferred choice over the second, and respondents used a scale ranging from strongly agree, 1, to strongly disagree, 7, to indicate their recommendation. In these questions, the first action (e. g., relying on the firm's employees in making the decision) was significantly less comprehensive than the second (e. g., seeking help from outsiders). Therefore, respondents who chose 1

recommended the least comprehensive action while those who chose 7 recommended the most comprehensive.

For the composite questions, participants also used a scale ranging from strongly agree, 1, to strongly disagree, 7, to indicate the extent of their agreement with a series of proposed actions. Scores for these three questions were the mean response to the series of items. To discourage response bias, the format and scales of the composites were opposite those of the single-response questions. Therefore, strong agreement with the action proposed in each item was the most comprehensive recommendation, and strong disagreement was the least comprehensive recommendation. Responses to the composite questions were rescaled for the data analysis so that results could be reported consistently; also, because Cronbach's alpha on these multi-item composites ranged from .83 to .94, each set was combined into a single item (Nunnally, 1967).

Two additional questions were used to assess respondents' opinions. The first of these determined whether respondents in different conditions generally favored or opposed the decision under consideration. The final question asked participants to evaluate the importance of the decision. Respondents again used 7-point scales.¹

Subjects and Procedures

Subjects in the first study were 321 second-year M. B. A. students. All had undergraduate degrees; they averaged 26.5 years of age and 4.2 years of full-time work experience; 72 percent were men, and 87 percent were U.S. citizens. The study took place on the same day in seven sections of a core strategic management course, each of which used a common syllabus. Cases and conditions were randomly assigned across the sections; to ensure that sections had equal numbers of the eight case-and-condition combinations, cases were precounted on the basis of enrollments and those numbers reduced to match normal attendance. The assignment of cases also tried to ensure, to the extent possible, that the total number of respondents in each case-and-condition cell was equal. Therefore, the mix of cases precounted for one section determined the starting point for counting out the next section's cases.

In the second study, the same cases were randomly assigned to 116 upper-middle level executives who participated in two identical six-week resident strategic management programs. The end of one program preceded the start of the other by one week, and the curricula and target markets of the programs were the same. This analysis combines the two groups in light of these similarities; moreover, MANOVA analysis across the two showed no significant differences in their recommendations. All of these participants held undergraduate degrees; they averaged 45 years of age and 26.5 years of full-time experience; 93 percent were men; and 72 percent were U.S. citizens. Again, random assignment required distributing as nearly as possible equal

¹ Copies of the instruments are available on request from the author.

numbers of the eight case-and-condition combinations to the two groups, while trying to ensure that total numbers of respondents in each case-and-condition cell were equal. Since attendance was almost always 100 percent, a simple precount based on known enrollments, and random distribution of cases at a regularly scheduled meeting of each group served to accomplish these objectives.

RESULTS

Study One: M. B. A. Students

As mentioned earlier in this paper, the first two questions were manipulation checks. As Table 1a shows, the results indicated that the motive manipulations were indeed effective ($F_{1,317} = 660.69, p < .001$); these participants correctly understood what motivated the decisions about which they were making recommendations. The results in Table 2a indicate that the performance level manipulations were also effective ($F_{1,317} = 2092, p < .000$); participants correctly identified the performance levels of firms.

The first step in testing the two hypotheses was to assess the effects of the manipulations on all of the dependent variables simultaneously. This research used a $2 \times 2 \times 2$ MANOVA to assess the interactions and main effects of case, decision motive, and performance level on respondents' recommendations. Neither the three-way nor any of the two-way interactions were significant (all F s were less than .98), so the main effects of the three factors were examined individually. The presence of differences across cases would have called into question the stability and generalizability of subsequent results. However, the effect of case on respondents' recommendations was not significant ($F_{10,295} = 1.09, p = .37$), so analysis proceeded to examine effects of decision motive and performance level.

To test Hypothesis 1, which stated that the actions taken in making strategic decisions that are motivated by problems will be more comprehensive than those taken in response to opportunities, the main effect of decision motive on respondents' recommendations was investigated. The first step, a multivariate test of significance using Wilks's lambda approximate F test, indicated that the actions that respondents recommended differed significantly ($F_{10,295} = 3.62, p < .001$) across motive conditions. Therefore, to get a more precise understanding of which variables were contributing the most to the between-cell differences, and to test whether the pattern of these differences was in the expected direction, the univariate analysis of variance (ANOVA) for each recommended action was examined.

As indicated in Table 1b, four actions contributed most strongly to the between-cell differences by exhibiting significant differences at the .05 level or better with a one-tailed test. As expected, respondents in the problem condition recommended more comprehensive actions than those in the opportunity condition; the former indicated they would seek significant help from outsiders ($F_{1,304} = 17.31, p < .000$), make significant out-of-pocket expenditures ($F_{1,304} = 7.30, p < .01$), and contact many outsiders for decision-making

TABLE 1
Results^a for the Main Effect of the Decision Motive, M. B. A. Students

Dependent Variables	SS	df	MS	F	Direction as Expected? (Actions Only)
(a) Manipulation Check					
Decision motive	970.09	1	970.09	660.69***	
	465.44	317	1.47		
(b) Univariate ANOVAs for Recommended Actions^b					
Assign to individual versus form group	4.78	1	4.78	1.10	—
	1320.54	304	4.34		
Rely on employees versus outsiders	53.88	1	53.88	17.31***	Yes
	946.36	304	3.11		
Base on gut feel versus formal analysis	2.53	1	2.53	1.43	—
	537.23	304	1.77		
Limit people involved versus involve many	1.83	1	1.83	.86	—
	635.20	304	2.09		
Few areas of expertise represented versus many	1.09	1	1.09	.32	—
	1013.58	304	3.33		
Limit direct expenses versus authorize significant expenses	17.37	1	17.37	7.30***	Yes
	723.14	304	2.37		
Judge on own merits versus consistency	13.52	1	13.52	5.89***	No
	697.99	304	2.30		
Breadth of expertise represented	0.28	1	0.29	.58	—
	150.00	304	0.49		
Breadth of outsiders contacted	2.71	1	2.71	3.77**	Yes
	218.67	304	0.72		
Breadth of reports/ summaries prepared	0.01	1	0.01	.02	—
	171.81	304	0.56		
(c) General Questions					
Agreement with the decision	1.26	1	1.26	.87	
	452.24	317	1.43		
Importance of the decision	0.70	1	0.70	.45	
	497.62	317	1.57		

^aThe number appearing under the labeled sources for SS, df, MS represents the error term.

^bProduced by MANOVA procedure; data reflect main effect in $2 \times 2 \times 2$ design with ten dependent variables.

* $p < .05$

** $p < .01$

*** $p < .001$

information and assistance ($F_{1,304} = 3.77, p < .05$). Contrary to expectations, respondents in the problem condition advised the less comprehensive course concerning the decision's need to be consistent with other decisions ($F_{1,304} = 5.89, p < .01$). Motive had no effect on whether respondents generally favored or opposed the decision being considered, or the importance that they attributed to it (see Table 1c).

To test Hypothesis 2, which stated that the actions taken in strategic decision-making processes of firms that are performing poorly will be more comprehensive than those taken in firms whose performance is excellent, the main effect of performance level on respondents' recommended actions was investigated. A multivariate test of significance (Wilks's lambda) indicated that the actions recommended by the respondents differed significantly ($F_{1,304} = 2.04, p < .05$) across performance level conditions. The ANOVA for each recommendation was examined again to determine which variables were contributing the most to the between-cell differences and to see if the pattern of these differences was in the expected direction.

As Table 2b shows, three of the recommended actions contributed most strongly to between-cell differences. Where performance was poor, respondents indicated they would take more comprehensive actions in seeking significant help from outsiders ($F_{1,304} = 2.93, p < .05$) and in contacting a broad range of outsiders ($F_{1,304} = 3.93, p < .05$) than they did where performance was excellent. However, as with problem-motivated decisions, under conditions of poor performance, respondents advised the less comprehensive course, making the decision on its own merits with little concern for its consistency with other decisions ($F_{1,304} = 7.68, p < .01$). Also, respondents in the poor performance condition characterized decisions as significantly more important than did respondents in the excellent performance condition ($F_{1,317} = 3.28, p < .05$; see Table 2c).

Study Two: Executives

As with the initial study, the first step in the analysis of the executive group was to assess the effectiveness of the manipulations. Responses to the first two questions indicated that both the decision motive ($F_{1,110} = 192.43, p < .001$) and performance level ($F_{1,110} = 620.60, p < .001$) manipulations were effective. Analysis again employed a $2 \times 2 \times 2$ MANOVA to assess potential interactions and main effects of case, decision motive, and performance level. As in the initial study, neither the three-way nor any of the two-way interactions were significant (all F s were less than 1.40). Therefore, main effects were examined individually. Since case once again had no significant effect on recommendations ($F_{10,96} = 1.02, p = .43$), analysis proceeded to direct tests of the hypothesized effects of decision motive and performance level. However, unlike the results of the initial study, multivariate tests of significance (Wilks's lambda) for both decision motive ($F_{10,96} = .47, p = .91$) and performance level ($F_{10,96} = .48, p = .89$) indicated no significant differences in the executives' recommended actions.

TABLE 2
Results^a for the Main Effect of Organizational Performance Level,
M. B. A. Students

Dependent Variables	SS	df	MS	F	Direction as Expected? (Actions Only)
(a) Manipulation Check					
Performance level	1177.91	1	1117.91	2091.72***	
	178.00	317	.56		
(b) Univariate ANOVAs for Recommended Actions^b					
Assign to individual versus form group	0.41	1	0.41	.09	—
	1320.54	304	4.34		
Rely on employees versus outsiders	9.13	1	9.13	2.93*	Yes
	946.36	304	3.11		
Base on gut feel versus formal analysis	0.30	1	0.30	.17	—
	537.23	304	1.77		
Limit people involved versus involve many	0.48	1	0.48	.23	—
	635.20	304	2.09		
Few areas of expertise represented versus many	7.66	1	7.67	2.30	—
	1013.58	304	3.33		
Limit direct expenses versus authorize significant expenses	0.03	1	0.03	.01	—
	723.14	304	2.37		
Judge on own merits versus consistency	17.64	1	17.64	7.68**	No
	697.99	304	2.29		
Breadth of expertise represented	0.05	1	0.05	.09	—
	150.00	304	0.49		
Breadth of outsiders contacted	2.82	1	2.82	3.93*	Yes
	218.67	304	0.72		
Breadth of reports/ summaries prepared	1.31	1	1.31	2.32	—
	171.81	304	0.56		
(c) General Questions					
Agreement with the decision	0.53	1	0.53	.37	
	452.97	317	1.43		
Importance of the decision	5.12	1	5.12	3.27*	
	493.21	317	1.56		

^aThe number appearing under the labeled sources for SS, df, MS represents the error term.

^bProduced by MANOVA procedure; data reflect main effect in $2 \times 2 \times 2$ design with ten dependent variables.

* $p < .05$

** $p < .01$

*** $p < .001$

Comparing Samples

As the preceding section reveals, there were major differences in results for the two groups. Initially it was assumed that the students' recommendations would generally be quite comprehensive and by the book; they might advise, for instance, forming specialized committees, involving lots of people, or conducting extensive analyses. On the other hand, it was assumed that the executives would generally make less comprehensive suggestions and would let firms rely on their own employees' experience and intuition in making the decisions. These assumptions partly derived from stereotyped differences that are often attributed to the two groups. More important, they were based on arguments that have suggested that M. B. A. programs overemphasize the analytical skills that often characterize comprehensive decision making (Hayes & Abernathy, 1980; Livingston, 1971), and that successful executives rely more on informed intuition than on comprehensive analysis (Summer, 1959; Wrapp, 1967).

As the first step in precisely comparing the process actions recommended by the M. B. A. students and by the executives, a one-way MANOVA analysis was conducted on the two groups. This analysis produced a multivariate test of significance ($F_{10,408} = 6.53, p < .001$) that indicated significant differences. To learn which actions best distinguished between the groups, as well as to determine whether the students made consistently more comprehensive recommendations, the univariate analysis of variance was examined for each of the recommended actions. As Table 3a indicates, the students' responses were significantly more comprehensive for three questions, and the executives' suggestions were more comprehensive on three others.

Specifically, the M. B. A. students' recommendations were more comprehensive in (1) encouraging the use of outsiders ($F_{1,417} = 16.05, p < .001$), (2) judging the decision in terms of how consistent it was with others being considered ($F_{1,417} = 7.84, p < .01$), and (3) contacting a broad range of outsiders ($F_{1,417} = 4.94, p < .01$). In contrast, the executives' more comprehensive responses concerned (1) wanting many versus just a few areas of expertise represented among the decision makers ($F_{1,417} = 3.36, p < .05$), (2) authorizing significant out-of-pocket expenditures ($F_{1,417} = 4.82, p < .01$), and (3) making conscious efforts to ensure that employees or outsiders who were directly involved in the decision process together provided significant expertise in a broad range of areas ($F_{1,417} = 17.79, p < .001$). There were no significant differences between the groups in respondents' agreement with the decision being considered, or in their perceptions of its importance.

Tables 4a and 4b provide descriptive statistics for the data used in the initial study, as well as for the comparison of the two groups.

DISCUSSION

Primary Conclusions

The M. B. A. students responded to strategic decisions that were motivated by problems and those motivated by opportunities very differently,

TABLE 3
Results^a for the Effects of Study Group

Dependent Variables	SS	df	MS	F	Most Comprehensive
(a) Univariate ANOVAs for Recommended Actions^b					
Assign to individual versus form group	1.06 1876.05	1 417	1.06 4.49	.24	—
Rely on employees versus outsiders	49.52 1286.99	1 417	49.52 3.09	16.05***	M. B. A. students
Base on gut feel versus formal analysis	0.88 887.63	1 417	0.87 1.98	.44	—
Limit people involved versus involve many	1.39 897.94	1 417	1.39 2.15	.65	—
Few areas of expertise represented versus many	11.83 1466.99	1 417	11.83 3.52	3.36*	Executives
Limit direct expenses versus authorize significant expenses	12.19 1054.38	1 417	12.19 2.53	4.82**	Executives
Judge on own merits versus consistency	18.65 993.09	1 417	18.65 2.38	7.84***	M.B.A. students
Breadth of expertise represented	8.49 199.00	1 417	8.49 .48	17.79***	Executives
Breadth of outsiders contacted	3.97 335.12	1 417	3.97 0.80	4.94**	M. B. A. students
Breadth of reports/ summaries prepared	0.02 219.64	1 417	0.02 0.53	.04	—
(b) General Questions					
Agreement with the decision	0.55 649.79	1 432	0.55 1.50	.36	
Importance of the decision	0.08 687.12	1 432	0.08 1.59	.05	

^aThe number appearing under the labeled sources for SS, df, MS represents the error term.

^bProduced by MANOVA procedure; data reflect one-way design with ten dependent variables.

* $p < .05$, two-tailed test

** $p < .01$, two-tailed test

*** $p < .001$, two-tailed test

and poor performance generated recommendations from them that were very different from those made when performance was excellent. Therefore, the results of the initial study provided strong support for the arguments of authors (Bourgeois, 1981; Dutton et al., 1983; Hambrick & Snow, 1977; Litschert & Bonham, 1978; Mintzberg et al., 1976) who have suggested that

TABLE 4
Means and Standard Deviations for Study One
and the Comparison of the Two Groups^a

Dependent Variables	(a) Study One ^b				(b) Two Group Comparison ^c	
	Decision		Performance		M. B. A.	
	Motive Conditions		Level Conditions			
	Opportunities	Problems	Excellent	Poor	Students	Executives
Manipulation Checks						
Decision motive	2.32 (1.16)	5.80 (1.26)			4.06 (2.12)	4.00 (2.25)
Performance level			6.13 (0.75)	2.30 (0.76)	4.22 (2.06)	4.41 (2.09)
Recommended Actions						
Assign to individual versus form group	4.41 (2.05)	4.20 (2.11)	4.35 (2.01)	4.26 (2.16)	4.31 (2.08)	4.46 (2.23)
Rely on employees versus outsiders	3.52 (1.62)	4.34* (1.89)	3.74 (1.73)	4.13* (1.86)	3.93 (1.81)	3.23* (1.81)
Base on gut feel versus formal analysis	5.33 (1.32)	5.49 (1.32)	5.36 (1.28)	5.46 (1.36)	5.41 (1.32)	5.29 (1.65)
Limit people involved versus involve many	2.47 (1.48)	2.38 (1.49)	2.47 (1.44)	2.38 (1.47)	2.42 (1.45)	2.53 (1.52)
Few areas of expertise represented versus many	3.99 (1.83)	3.83 (1.86)	4.03 (1.83)	3.79 (1.85)	3.92 (1.84)	4.27* (1.97)
Limit direct expenses versus authorize significant expenses	3.63 (1.45)	4.12* (1.64)	3.90 (1.59)	3.85 (1.59)	3.87 (1.56)	4.25* (1.74)
Judge on own merits versus consistency	5.90 (1.33)	5.44* (1.72)	5.90 (1.42)	5.44* (1.65)	5.67 (1.55)	5.25* (1.64)
Breadth of expertise represented	5.34 (0.72)	5.28 (0.69)	5.33 (0.69)	5.29 (0.72)	5.31 (0.71)	5.63* (0.66)
Breadth of outsiders contacted	4.31 (0.83)	4.50* (0.86)	4.31 (0.87)	4.50* (0.82)	4.39 (0.85)	4.18* (1.02)
Breadth of reports/ summaries prepared	6.16 (0.80)	6.17 (0.69)	6.23 (0.67)	6.10 (0.81)	6.17 (0.74)	6.15 (0.64)
General Questions						
Agreement with the decision	2.42 (1.07)	2.59 (1.30)	2.55 (1.18)	2.45 (1.20)	2.50 (1.19)	2.42 (1.80)
Importance of the decision	5.62 (1.15)	5.73 (1.34)	5.56 (1.25)	5.78* (1.24)	5.67 (1.25)	5.63 (1.28)

^a Standard deviations are in parentheses.

^b N = 321

^c N = 437

*Indicates significant difference across conditions.

decision motive and organizational performance level are contextual variables that can have major effects on the way that strategic decisions are made.

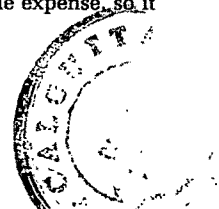
As for the precise effects of motive and performance level, the pattern of results from the initial study is mixed. An examination of individual items revealed that respondents faced with problems endorsed actions that were significantly more comprehensive in terms of generally seeking outside help, making direct expenditures, and contacting a wide range of outsiders. Similarly, poor performance also increased respondents' professed willingness to seek outside help, and to contact a wide range of outsiders. These differences supported the hypotheses, but another result did not. Contrary to what was expected, problems and poor performance resulted in decisions being evaluated more on their own merits than in relation to other decisions under consideration. Therefore, it appears that although problems and poor performance may encourage information search and resource expenditures, they can also make consistency seem unimportant. In such a context, there was apparently a strongly felt need to focus attention on the decision at hand.

In contrast, results with upper-middle level executives as respondents did not establish the effects of either decision motive or performance level. Therefore, it appears that the decision processes that experienced, successful² executives prefer are relatively unaffected by the contextual factors that are articulated in the literature.

Why didn't results from both groups support current theory? The most obvious explanation is that the theory is not sufficiently developed to capture the complexity of strategic decision processes. Srivastva (1983: 2) recently raised this possibility by suggesting that executives employ a mental process of "envisioning" that allows them to make decisions that guide their organizations toward generalized goals. Extended to strategic decision processes, this argument suggests that successful executives develop generalized concepts of what constitutes a strategic situation. More important, such a concept is likely to be independent of any labeling or expected effects that others articulate. Therefore, given a hypothetical firm with annual sales of \$190 million, the executives saw a decision on facilities costing \$1.4 million as important regardless of the decision's motive or the firm's performance level. They recognized the potential consequences and knew that risk is a part of any such decision.

In addition to the possibility the current theory does not capture the complexity of the strategic process, some would suggest that it simply overstates the effects of contextual factors. For example, Child (1972) argued that the values of dominant coalition members may have a more profound impact on decision processes than do the contextual variables articulated in the literature. The values that executives bring to their work, and especially values that lead to promotions and that change as individuals move up in

² These respondents were sponsored by their organizations at considerable expense, so it would seem that they were successful.



their organizations, are likely to affect how they make strategic decisions. For instance, experienced executives may believe they need to gain broad-based support for strategic decisions. Such values may outweigh the motives for decisions and the performance levels of their firms (Hambrick & Mason, 1984). Specific values surely vary among executives, but as a class such values may be the dominant force in determining how strategic decisions are made. However, the differing results of the two studies may not be due entirely to either the limitations of current strategic process theory or to the dominance of individual factors over contextual.

Comparative Conclusions

It was not an initial purpose of this research to assess differences in the process actions recommended by M. B. A. students and executives. However, because the primary results of the two studies were so different, making such a comparison seemed logical. As mentioned earlier in this paper, when intergroup differences first appeared it was assumed that the students' recommendations would be more comprehensive than the executives'. This expectation grew somewhat from the two groups' stereotypes, but mostly from arguments regarding the analytical proclivities of M. B. A.'s (Hayes & Abernathy, 1980; Livingston, 1971) and the intuitive preferences of executives (Summer, 1959; Wrapp, 1967).

Examination of individual items identified six that contributed the most to the difference between the two groups. It also showed that the students did not always recommend more comprehensive actions than the executives. The students advised more comprehensive actions on only three items: bringing in outsiders, concern for consistency among decisions, and range of outsiders contacted. Two of these responses suggest that M. B. A. students may be somewhat naive regarding the value of consultants and other outsiders, perhaps because many of them want to become outside advisors—consultants or investment bankers, for instance—themselves.

The executives were more willing to make significant out-of-pocket expenditures, which may simply show that experience has taught them that strategic decision making consumes resources. Of greater interest were the two items, one a single-response and one a composite item, indicating that the executives preferred to involve people who as a group provided significant expertise in many areas. The students wanted to restrict participation in the decision about new facilities to only production personnel, but the executives saw the decision as requiring input from individuals with knowledge of a variety of functional and specialty areas. This difference may reflect Child's (1972) argument about the effects of executives' values; here, these effects may manifest political insight, the recognition that such decisions often require broad-based support. However, the overall pattern points to yet another explanation.

The comparative results discussed in the preceding section also suggested that the process executives use to make strategic decisions may be more complex than many authors recognize. As Weick (1983) recently

suggested, previous research may have drawn oversimplified conclusions because executives act and think simultaneously, and their actions hide their decision making processes from observers. More important, Pondy (1983) provided a detailed description of strategic processes that fits the pattern of recommendations made by the executives who figured in the present research. Pondy asserted that executives do best when they combine rational, analytic techniques and intuition. Moreover, he suggested that what Quinn (1980: 51-56) captured in his description of "logical incrementalism" was just such a combination. The comparative results reported in this paper appear to support such arguments. Successful executives may make strategic decisions through a process that accommodates aspects of both rational analysis and intuitive synthesis. In this research, for instance, executives obtained multiple perspectives but refrained from formally addressing issues of consistency.

3

CONCLUDING OBSERVATIONS

Recent papers (Cosier, 1981; Mitroff & Mason, 1981) have debated the appropriateness of using experiments to study strategic process phenomena. The present research illustrates both the value and shortcomings of such methods. First, results of the initial study with M. B. A. students strongly supported the notion that decision motive and organizational performance level are contextual factors that can influence how strategic decisions are made (Bourgeois, 1981; Dutton et al., 1983; Hambrick & Snow, 1977; Litschert & Bonham, 1978; Mintzberg et al., 1976). Moreover, those effects were consistent for different decisions, even though the respondents considered decisions to be more important when performance was poor than when it was excellent. In addition, the results suggested that problems and poor performance led to patterns of information search, resource expenditures, and concerns for consistency that differed from patterns that emerged in a context of opportunity and excellent performance.

In contrast, results of the second study yielded evidence that cast doubt on the generalizability of these arguments. The strategic decision processes of organizations that are dominated by highly experienced and successful executives may not be subject to the contextual factors articulated in the literature. Moreover, comparing the two groups studied gave some evidence that the decision processes preferred by such executives exhibit characteristics of both rational analysis and intuitive synthesis. Taken together, the primary results and the comparison of the two studies suggest that in this instance an experimental approach has indeed been valuable in studying strategic decision processes. However, the experimental method may have had an unintended effect.

One reason why the M. B. A. students were more susceptible to the motive and performance level manipulations may be that the method used in these studies produced response differences that reflected the recent training of the two groups, not an inadequacy of contemporary theory. This issue

has both methodological and practical implications. For example, it is common for M. B. A. students, including those who participated in the study, to analyze countless cases as part of their training. In addition, good case analysis requires students to be aware of, and to react to, cues that are imbedded in cases. Such cues may also take on inordinate importance because the students are told that they must make decisions with imperfect information. Therefore, labels such as the problem and the opportunity become very salient, as do performance characteristics. Similarly, the expected positive or negative effects attributed to the alternative decision motives may have been inordinately salient to the students. Therefore, some of the differences in the results of the two studies may illustrate effects of contemporary curricula on the decision making preferences that recent business school graduates bring to their first jobs.

A final methodological issue arises from the fact that it is usually difficult to obtain variance in laboratory settings (Kerlinger, 1973), so differences that emerge in such settings may be particularly important. However, difficulty in obtaining variance may leave some questions unanswered. As Tables 4a and 4b illustrate, the means of most of the significant differences varied by .50 or less, even though the sample was quite large. A .50 variation is not trivial with a scale of only seven points, and the within-condition variance was small enough to allow statistically significant differences to emerge across conditions. However, the absolute size of the reported differences raises the question of whether the conditions have practical as well as statistical significance for strategic decision making. The present data cannot answer that question, but it is one of several issues that deserve future attention.

These observations suggest that the reported results offer answers to several questions and raise still others. For example, they provide introductory evidence indicating that there are indeed situations where decision motive and performance level can affect how strategic decisions are made, and that information search, resource expenditures, and concerns for consistency are among the actions most likely to be affected. However, the effects of these contextual variables are likely to be strongest in field settings, so future research should use such settings to try to verify their practical significance. In addition, the combined results suggest that more work needs to be done (1) to test the generalizability of current strategic decision process theory, (2) to develop theory that more accurately reflects how executives make strategic decisions, and (3) to investigate the effects of current pedagogical techniques on decision making processes. Progress in these areas could significantly improve understanding of, and eventually the quality of, strategic decision making processes.

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APPENDIX

The questions used to measure participants' recommended strategic process actions are listed below. Respondents answered each single-response question (1 through 7) as well as all of the items in the composite questions (8 through 10) on a 7-point scale that ranged from strongly agree to strongly disagree.

1. I would assign *primary responsibility* for directing the decision process to one individual, as opposed to forming a special group of several people.
2. I would have Northeast rely *primarily* on its own employees in making the decision, and not seek significant help from "outsiders" (e. g., consultants, other customers).
3. I would base the decision *primarily* on the "gut feel" and experience of key employees, and not on extensive, formal analysis.
4. I would limit the number of people that are *directly involved* in the decision process, as opposed to involving as many people as possible.
5. I would limit direct involvement to people who have significant expertise in a *few key areas* (e. g., production), and not try to insure that many areas are represented.
6. I would *restrict* the amount of direct out-of-pocket expenditures made during the decision process (e. g., for consultant fees), and not authorize significant expenses.
7. I would judge the decision of whether to modify the manufacturing facilities on its own merits, and not on whether it is consistent with other decisions being considered at Northeast (e. g., whether to incorporate a radical new technology into future products).
8. In determining whether to modify their manufacturing facilities, I would want employees or outsiders *directly involved* in the decision process to have *significant expertise* in (circle one for each)—sales, marketing, production, research and development, accounting and control, finance, personnel, general management.
9. I would contact the following "outsiders" to provide information or assistance in making the decision (circle one for each)—individuals from similar firms, industry consultants, suppliers, customers, equipment manufacturers, financial experts, individuals from other industries, management consultants.
10. In deciding whether to modify the manufacturing facilities. I would prepare written reports or summaries that (circle one for each)—include proforma profit and loss statements, include proforma budgets and funds flows, address the feasibility of implementing the decision, state the assumptions the evaluation is based on, provide contingency plans for possible occurrences, try to identify all possible consequences of the decision.

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THE FIT BETWEEN TECHNOLOGY AND STRUCTURE AS A PREDICTOR OF PERFORMANCE IN NURSING SUBUNITS

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Regression analyses of field study data from 27 nursing subunits supported the hypothesis that a simple measure of fit between technology and structure is a better predictor of quality of care than either technology or structure alone, or the two together. The results of this study were thus consistent with the growing body of congruency literature, and they suggest that a simple measure of structure may be quite useful in such research.

The issue of links between performance and organizational design has been of interest to many researchers. Woodward (1965) suggested a contingency relationship between technology, structure, and performance. Since then, however, research has focused primarily on better definitions of technology and structure and on the relationship between technology and structure.¹ Until recently most research on technology and structure has ignored performance (Argote, 1982; Dalton, Tudor, Spendolini, Fielding, & Porter, 1980). But lately there has been an increasing emphasis in research on the impacts of technology and structure on effectiveness (Daft & McIntosh, 1981; Fry, 1982; Withey, Daft, & Cooper, 1983).

However, this recent research has not been without its problems. First, the measurement of technology and performance has been problematic, particularly with respect to level of analysis. Several works (Fry, 1982; Fry & Slocum, 1984; Van de Ven, Delbecq, & Koenig, 1976) have suggested that technology can best be applied at the subunit level. Further, there has been a great deal of disagreement concerning how to measure the contingency relationship between technology and structure as it affects performance (Argote, 1982; Dalton et al., 1980; Dewar & Werbel, 1979; Fry & Slocum, 1984; Schoonhoven, 1981).

Recently, there has been some acceptance of the definition of technology provided by Perrow (1967, 1970) and defined operationally by Lynch (1974) and by Overton, Schneck, and Hazlett (1977). Recently, too, studies of technology and structure that have analyzed subunits have been more successful than those that have dealt with larger units. Several studies (Argote, 1982; David, Randolph, & Pearce, 1982; Dewar & Werbel, 1979; Fry & Slocum,

¹ For excellent reviews see Ford and Slocum (1977) and Fry (1982).

1984; Schoonhoven, 1981) have all focused on subunit performance and used the fit between technology and structure in workgroups as a predictor of performance. By examining subunits, these studies avoided the merging of multiple technologies into modal measures for organizations. Since organizations have more than one technology, it is clear that such modal measures become rather meaningless when these various technologies are combined into overall averages. Subunit measures of technology avoid those problems, because technology is more uniform within subunits than within organizations. Still, Schoonhoven (1981) criticized existing contingency research for: (1) a lack of clarity owing to the ambiguous nature of hypotheses tested; (2) a lack of clarity about contingency relationships and interaction effects; (3) nonexplicit mathematical functions of the implied interactions; (4) unclear analytic models that have been inconsistent across studies; and (5) untested assumptions about contingency relationships. And Van de Ven and Drazin (1985) outlined a number of problems with the concept of fit as applied in existing contingency theory literature.

The purpose of the present study was to determine whether a simplified measure of fit between technology and structure would relate to quality of care in nursing subunits. As suggested by Schoonhoven (1981), this study specified contingency relationships between particular pairs of technology and structure variables to obtain specific testable hypotheses. Furthermore, this study clearly defined the nature of the fit—the contingency relationship—and the particular analytic model to be applied. We designed this study to provide specific data to test this basic contingency hypothesis: the fit between technology and structure will be a better predictor of quality of care than (1) technology alone, (2) structure alone, or (3) technology and structure as separate predictors in the same model.

REVIEW OF LITERATURE ON THE FIT BETWEEN TECHNOLOGY AND STRUCTURE

A number of authors (e. g., Dalton et al., 1980; Miles, Snow, Meyer, & Coleman, 1978) have argued conceptually that technology and structure must fit together for an organizational unit to be effective. Woodward (1965) also found rather clear empirical support for this relationship in her studies. However, most studies of technology and structure have not employed performance as a criterion variable (Dalton et al., 1980; Fry & Slocum, 1984). Rather, they have focused on the relationship between technology and structure and implicitly assumed that a feedback loop from performance drove this relationship. Clearly, this was a deficiency in many of the technology and structure studies conducted during the 1960s.² More recently, authors have begun to focus again on performance and on contingency relationships between technology and structure.

Miles and colleagues (1978) argued conceptually that choices concerning technology and structure are among the many strategic choices that

²For a review, see Fry (1982).

managers make. They also argued that decisions about products and markets shape choices of technologies. By making strategic product/ market choices, managers define the relevant external environments for their organizations, as well as their units, and thus define the levels of uncertainty that must be managed through technologies and structures. As Perrow (1967) suggested, increased uncertainty makes it difficult to analyze problems and increases numbers of exceptions.

Once managements choose technologies, they must define matching structures (Miles et al., 1978). Decisions must be made regarding the natures of hierarchies, degrees of differentiation and integration, degrees of formalization and centralization, and the characteristics of organizational communication. These aspects of structure must be consistent with the technology chosen if unit performance is to be high (Randolph, 1981). For example, if a technology has high uncertainty, a fluid and organic structure will probably be more appropriate than a rigid and bureaucratic structure. But if a technology is highly certain, a rigid and bureaucratic structure may be more appropriate. Otherwise, opposition between technology and structure may undermine performance effectiveness. Hence, structure or technology alone or even together as separate predictors in the same model are likely to be less valuable in predicting performance than the fit between technology and structure will be (David et al., 1982).

On the empirical side, several recent studies using different operational definitions of fit have supported the idea that fit between technology and structure is an important predictor of performance. Dewar and Werbel (1979) found that both technology and structure and the fit between them predict performance. Using data from 52 departments of 13 organizations, they found that fit between technology and centralization was a significant predictor of internal conflict. Likewise, fit between technology and surveillance and enforcement actions was a significant predictor of employee satisfaction. Schoonhoven (1981), in studying 17 operating rooms, found that fit between technological uncertainty and destandardization and fit between technological uncertainty and decentralization were significant negative predictors of severe morbidity. Argote (1982), in a study of 30 emergency rooms, found that fit between input uncertainty and means of coordination was a significant predictor of promptness of care, quality of nursing care, and quality of medical care. And recently, Fry and Slocum (1984), in a study of 35 police units, found that the interaction between search behavior and specialization was significant for workgroup performance, but that other interactions studied were not. Still, there is a need to conduct further studies with specific hypotheses concerning the effects of the fit between technology and structure on performance. Four empirical studies do not exhaust our understanding of these contingency relationships. The four were in different settings; they used different dependent variables; and perhaps most significant, they used three different operational definitions of fit.

Two studies (Dewar & Werbel, 1979; Fry & Slocum, 1984) used residuals of the regressions of structure on technology as their measures of fit, and

regressed them on effectiveness. However, as Dewar and Werbel pointed out, residuals measure only a linear notion of fit. Residuals also contain measurement error that attenuates contingency relationships, and they are complex measures to conceptualize at a pragmatic level.

Schoonhoven (1981) measured fit with interaction terms and examined plots of the interaction effects to test for nonmonotonic relationships. Her hypotheses were stated in a complicated fashion; for example "When technology uncertainty is low, increases in decentralization will negatively influence effectiveness," and "When technology uncertainty is high, increases in decentralization will positively influence effectiveness" (1981: 357). Such hypotheses are hard to understand. Moreover, as Dewar and Werbel (1979) suggested, interaction terms are highly correlated with the terms that compose them, which creates multicollinearity problems in regression analyses.

Argote (1982) also used these problematic interaction terms to measure fit. In addition, she conducted split-sample analyses for high- and low-uncertainty subgroups. Obvious problems with split-sample analyses are restriction of range, reduction of sample size for regression analyses, and impossibility of measuring the magnitude of fit variables relative to other variables.

Essentially, these various measures of fit point up the need to clarify the concept and to search for simpler ways of measuring it. In this study we used the absolute value of the difference between the values of technology and structure to measure fit. This measure was appealing because it is simple, yet it powerfully reflects nonmonotonic relationships. No causation is implied—technology does not determine structure—but the fit between the two determines performance. For every value of technology, there is an appropriate value of structure that determines high-effectiveness. This definition of fit is consistent with the general congruency model defined by Joyce, Slocum, and Von Glinow (1982); moreover, as Schoonhoven (1981) explained, this definition implies an additive relationship between technology and structure that influences effectiveness. We will explore our measure in greater detail in the Methods section. But first, let us provide conceptual definitions of the key variables in this study and the hypotheses to be tested.

TECHNOLOGY, STRUCTURE, AND FIT DEFINED

There are a number of definitions of technology, structure, and the fit between the two (Fry, 1982; Gerwin, 1981; Joyce et al., 1982). This study used measures of technology and structure adopted from previous research and a measure of fit between technology and structure based on the general congruency model (Joyce et al., 1982).

Working within Perrow's (1967) framework, Overton and colleagues (1977) measured three characteristics of technology in nursing subunits: uncertainty, instability, and variability.³ Uncertainty is the degree to which

³Leatt and Schneck (1981) have since replicated these measures.

work to be performed is difficult to understand and complex. Instability is the degree to which unpredictable fluctuations in work techniques and practices occur. Variability is the degree to which workers must engage in many different tasks.

Alexander (1982), using work by Leifer and Huber (1977) and Duncan (1971), identified three characteristics of structure in nursing subunits: vertical participation, horizontal participation, and formalization. Vertical participation is the degree to which supervisors and subordinates consult together concerning job-related tasks and decisions that must be made. Horizontal participation is the degree to which individuals are involved with peers in decision making and defining tasks. Formalization is the extent to which rules, procedures, and instructions exist and are used.

As Joyce and colleagues (1982) suggested, congruency between technology and structure can take three forms: effect, general, and functional. Effect congruency is the relative importance of variables in explaining dependent variables. This model focuses on the main effects of variables that might interact and assumes that explained variance will continue to increase with addition of independent variables. General congruency exists when similar dimensions of independent variables are matched either high or low. The focus is on the interaction and matching of independent variables as they affect performance. Finally, functional congruency suggests that one or the other of two independent variables will lead to better performance, but that their joint effect is limited. This model suggests a type of substitution effect for the independent variables.

The present study focuses on (1) the general congruency model and (2) a simplified measure of fit between technology and structure as a predictor of performance. In response to one of Schoonhoven's (1981) points, we have explicitly specified the functional form of the contingency relationship, as well as which pairs of technology and structure variables need to be matched to yield high performance.

HYPOTHESES

Given the contingency studies reviewed above, it would seem that as technology becomes less routine, work units need to become increasingly organic to be effective. Conversely, as technology becomes more routine, work units need to become increasingly mechanistic to be effective. This general hypothesis, grounded on a general congruency model of fit (Joyce et al., 1982), suggests that fit between technology and structure is the critical predictor of performance.

Hypothesis 1: The fit between technology and structure will be a better predictor of performance than technology, structure, or technology and structure.

Three additional, more specific hypotheses follow from Hypothesis 1 and address Schoonhoven's (1981) criticism concerning ambiguous hypotheses.

We can hypothesize which technology variables must match with which structure variables to yield higher performance:

Hypothesis 2: The fit between instability and vertical participation will be a significant predictor of performance. High (low) levels of instability, when matched with high (low) levels of vertical participation, will yield high performance.

Hypothesis 3: The fit between variability and horizontal participation will be significant predictor of performance. High (low) levels of variability, when matched with high (low) levels of horizontal participation, will yield high performance.

Hypothesis 4: The fit between uncertainty and formalization will be a significant predictor of performance. High (low) levels of uncertainty, when matched with high (low) levels of formalization, will yield low performance.

Hypotheses 2, 3, and 4 deserve further comment. We made these matches of technology and structure characteristics because they were theoretically appealing and included each technology and structure dimension only once. By analyzing these separate subhypotheses, we were able to allow for differing directional matches among the characteristics that could have been masked by taking technology and structure as unidimensional constructs.

Hypothesis 2 suggests that vertical participation must accompany instability for effective performance. This match seemed appropriate because instability as a characteristic of technology relates to work's predictability. Organizations can best handle instability through adjusting the supervisory process of vertical participation (Comstock & Scott, 1977). We found support for this statement in Randolph and Finch's (1977) study, in which an increase in communication was associated with unpredictability in effective units of a hospital, and a decrease in vertical communication was associated with predictability in effective units. Further support came from Schoonhoven's (1981) research. She found that the interaction between decentralization, a concept similar to vertical participation, and technological uncertainty, a concept similar to instability, was significantly and negatively related to her measure of morbidity. Thus, when unpredictable changes occur frequently, subordinates and superiors need to interact more frequently than they previously did to resolve these problems. But when changes are predictable, subordinates and superiors do not need to interact frequently.

Hypothesis 3 states that greater variability in the tasks people must perform in subunits increases the need for horizontal participation; alternatively, lower variability means little need for horizontal participation. Hence we would anticipate that a fit between these two variables could strongly affect performance. Variability reflects that aspect of technology relating to differences in work tasks caused by differences in throughput. It seemed appropriate to match it with the dimension of structure dealing with workers'

opportunities to participate in decision making. Again, studies by Schoonhoven (1981) and by Randolph and Finch (1977) offered tentative support for this prediction. When tasks vary greatly, high effectiveness relies on employees' expertise. The less variability exists, the less need there is for worker participation. Indeed, if tasks to be performed vary little, worker participation may actually introduce unnecessary uncertainty and diminish effectiveness.

Finally, with respect to Hypothesis 4, formalization seems to be a common and efficient way of dealing with low uncertainty (Galbraith, 1977). When work to be performed is relatively easy to understand, rules and procedures can effectively regulate people's activities. However, as uncertainty increases, formalization may be an inappropriate structure. Both Argote (1982) and Schoonhoven (1981) have supported such a prediction. Argote found that lack of complete information about emergency room patients interacted with the extent to which rules spelled out activities to predict high organizational effectiveness. Schoonhoven (1981) found a significant interaction effect between uncertainty and destandardization, as related to her measure of severe morbidity. Additional analysis revealed that low uncertainty matched with standardization increased effectiveness, as did high uncertainty matched with destandardization. Thus high uncertainty may limit organizations' abilities to formalize activities or may make formalization too costly to be effective. Under such conditions, it may be better to rely on people's expertise.

METHODS

This study examined 27 nursing subunits in three hospitals in a southeastern city. The group included many types of subunits, including medical-surgical, emergency, nursery, postpartum, labor and delivery, pediatric, and intensive care. Such variety has been lacking in other contingency studies. Thus, we anticipated that technology, structure, and performance would vary across subunits and allow meaningful regressions with which to test our hypotheses. We distributed questionnaires addressing the technologies and structures of the nursing subunits to nursing personnel and head nurses; 151 individuals returned them for an 81 percent response rate. All respondents worked full-time and had been in their subunits for at least three months. The distribution of registered nurses, licensed practical nurses, and other nursing personnel in the respondent group reflected the total distributions of personnel in the various subunits. Two pairs of trained registered nurses assessed subunits' performance levels as explained later in this section.

Measures of Technology and Structure

The 21-item instrument developed by Leatt and Schneck (1981) served to measure technology.⁴ Each of the questions used a 5-point scale, with 1 for routine and 5 for nonroutine, to solicit respondents' opinions about task

⁴These items can be found in Leatt and Schneck (1981) and were based on the 34-item instrument developed by Overton and colleagues (1977).

behavior, as distinguished from job attitudes.⁵ The reliabilities in this study for the three technology scales, instability, variability, and uncertainty, were .86, .77, and .62.

An instrument developed by Leifer and Huber (1977) on the basis of Duncan's (1971) empirical findings was adapted to the nursing context to measure structure (Alexander, 1982). We chose this instrument because it was simple and seemed to distill structural concepts from many other instruments. The questionnaire, which appears in the Appendix, contains 21 items, each with a 5-point scale with 1 for mechanistic, 5 for organic.⁶

We asked respondents to select responses that best represented their subunits. In this study, reliabilities for the three dimensions of structure, vertical participation, horizontal participation, and formalization, were .74, .63, and .61. Factor analysis of the data was used to confirm the items that loaded on each scale.

Subunit scores were created for the three technology and three structure scales by calculating the mean responses of nursing personnel within each subunit. Analyses of variance revealed significantly greater variance on the technology measures between subunits than within them. Analyses did not, however, yield significant differences in variance for the structure measures. Thus, aggregation of the technology data by subunit seemed quite appropriate, but aggregation of the structure data was perhaps questionable. However, the standard deviations of these variables suggested levels of variance high enough to allow us to proceed with regressions to test our hypotheses.

Measure of Fit

Schoonhoven (1981) suggested several possible functional forms for operationally defining contingency relationships. One is a multiplicative model based on an assumption that low levels of either of two variables will reduce effectiveness. This approach seemed deficient, because simply reporting interaction effects does not specify relationships. As Schoonhoven reported, analyses must include plotting joint effects of main and interaction terms to test contingency hypotheses properly. Another form of measurement of fit is a matching model that implies that for each value of technology there is an optimum value of structure. Deviations in either direction reduce effectiveness. Schoonhoven suggested a third form, multiple maxima, like those in harmonic functions. Argote (1982) added another way to go beyond interaction effects with split sample analyses, but that procedure limits sample size. This list of ways to measure fit is not exhaustive.

The measure of fit used in this study is consistent with the matching definition provided by Schoonhoven (1981), and with the general congruency model of Joyce and colleagues (1982). This measure is also quite simple and easy to apply. It assumes that for each value of a technology variable

⁵Leatt and Schneck (1981) reported the reliability and validity of this instrument to be quite acceptable.

⁶Alexander (1982) has shown the validity and reliability of this instrument to be acceptable.

there is a best value of structure in terms of high performance. Fit is thus the absolute difference between the values for technology and structure:

$$\text{Fit} = |T - S|$$

For example, previous studies have generally predicted that mechanistic structures combined with routine technologies will yield high performance (e. g., Argote, 1982; Schoonhoven, 1981). We therefore scaled structural variables so that low numbers represented mechanistic structures, and scaled technology variables so that low numbers represented routine technologies, as Figure 1 shows.

FIGURE 1
Scaling of Structure and Technology Variables

	Mechanistic				Organic
	1	2	3	4	5
Structure	<hr/>				
	Routine				Nonroutine
	1	2	3	4	5
Technology	<hr/>				

The simplicity and power of the resulting fit variable is appealing. If technology is routine, marked 1, the prediction is that the best structure for an effective organization would be mechanistic, also marked 1. The further from 1 the structure values goes, the worse performance would be, so the value for fit is inversely related to performance. If technology is nonroutine, marked 5, the best structure for effectiveness would be organic, also marked as 5. The further the structure value is from 5, the worse performance would be; again, fit is inversely related to performance.

It should be noted that this measure of fit allows predictions similar to Schoonhoven's (1981) nonmonotonic hypotheses, but that our assessment is more straightforward than hers. Furthermore, it avoids the multicollinearity problems of interaction analysis and the purely linear notion of fit as measured by residuals of the regression of structure on technology (Dewar & Werbel, 1979), as well as the restriction of range problems found in split sample analyses (Argote, 1982).

However, the use of subtraction to determine scores, sometimes called difference score analysis, remains controversial (Johns, 1981) since subtraction can lead to biased estimates because of ceiling effects of the two variables involved. However, much of the controversy has centered on using

difference scores in analyzing change rather than for combining separate variables. Indeed, the concept of fit implies combining two variables into one new variable, and the simple additive measure seems to do that nicely. Use of this measure reduces the statistical problems of potential unreliability and systematic correlations with other components of difference scores (Johns, 1981). Using the Cohen and Cohen (1975) formula for reliability of difference scores, we found reliability coefficients of .66, .72, and .67 for the three fit variables in this study. No correlation between fit variables was significant.

Measurement of Performance

The performance measure selected for this study was quality of nursing care as assessed by the Rush-Medicus Nursing Process Monitoring Methodology (Hegyvary, Haussmann, Kronman, & Burke, 1979). It evaluates nursing processes, including assessment, planning, intervention, and evaluation of patient care. Two pairs of trained registered nurses collected data on 340 patients in the 27 subunits. Data were obtained at different times of day and on different days of the week from (1) patients' records; (2) interviews with nursing staff and patients; (3) observation of patients and of subunit management; and (4) inferences from observations. The Appendix lists some of the questions used to gather data. Hegyvary and colleagues did extensive reliability and validity testing of the instrument. Interrater reliabilities in the present study were .88 and .92 for the two pairs of observers. For this instrument, subunit quality scores can range from 0 to 100; in this study, scores ranged from 66.16 to 90.66, with a mean of 79.08 and a standard deviation of 5.48.

Analysis Procedures

To test the hypotheses, a hierarchical regression was conducted for performance on technology and structure, with the three fit variables from Hypotheses 2, 3, and 4 stepped in after the technology and structure variables. We used Cohen and Cohen's (1975) formula to compare the explanatory power of the two regressions and also conducted regressions of only the fit variables as predictors of performance.

RESULTS

A hierarchical regression model tested (1) the contributions of the technology and structure dimensions to quality of care and (2) the fit predictions. Table 1 gives results. Using both technology and structure as independent variables produced significant results in the first step ($\bar{R}^2 = .35$, $F = 3.34$, $p < .05$).⁷ The reduced model (Neter & Wasserman, 1974: 88) showed that the technology dimensions taken alone made a significant contribution ($\bar{R}^2 = .40$, $F = 5.83$, $p < .01$) to quality of care in nursing subunits. However, the structure dimensions alone were not a significant predictor of subunit quality ($\bar{R}^2 = .18$, $F = 2.44$, n. s.). It is, of course, possible that problematic subunit aggrega-

⁷ where \bar{R}^2 = adjusted R^2 .

tion of the structure scales led to this result. The change in \bar{R}^2 from the use of the technology dimensions alone to the use of technology and structure dimensions together was not significant, as a comparison using Cohen and Cohen's formula (1975, 135) indicated. Indeed the \bar{R}^2 was greater for the three technology dimensions alone (.40 vs. .35).

Table 1 also shows the second step in the hierarchical regression model, in which the three hypothesized fit variables—the absolute differences between

TABLE 1
Results of Hierarchical Regression of Quality of Care on Technology and Structure Dimensions and on Fit between Technology and Structure^a

Independent Variables	Unstandardized Coefficients	
	Step 1 ^{b,c}	Step 2 ^c
Technology		
Instability (I)	2.42 (1.38)	1.73 (1.30)
Variability (V)	-1.67 (0.80)	-1.14 (0.68)
Uncertainty (U)	1.06 (1.27)	0.56 (1.22)
Structure		
Vertical participation (VP)	-1.26 (0.82)	-0.45 (0.75)
Horizontal participation (HP)	-1.24 (0.87)	-0.96 (0.75)
Formalization (F)	1.50 (1.02)	1.20 (0.88)
Fit		
I - VP		1.20 (1.45)
V - HP		-2.42* (1.05)
U - F		2.64** (0.91)
R^2	.50	.71
\bar{R}^2	.35	.59
F	3.34*	4.53**

^a $n = 27$.

^b The reduced model of technology variables alone was significant ($R^2 = .47$, $R^2 = .40$, $F = 5.83^{**}$), but the reduced model of structure variables alone was not significant ($R^2 = .27$, $R^2 = .18$, $F = 2.44$).

^c Standard errors are in parentheses.

* $p < .05$

** $p < .01$

the technology and structure dimensions—were added to test for any increment in explained variance. This regression was significant ($\bar{R}^2 = .59$, $F = 4.53$, $p < .01$). The incremental \bar{R}^2 for this regression over the regression of the technology and structure dimensions together was also significant ($F = 3.95$, $p < .05$). The fit between instability and vertical participation was not significant, but the fits between variability and horizontal participation and between uncertainty and formalization were significant. Relatively greater variability matched with greater horizontal participation increased quality of care, hence the negative sign. And relatively greater uncertainty in technology matched with greater formalization, increased quality of care, hence the positive sign. This second finding, the match between nonroutine technology and mechanistic structure, was contrary to our hypothesis.

Two other regressions are of interest here. First, a regression of all nine possible combinations of variables for fit between technology and structure indicated that the three fit variables reported in Table 1 were the best predictors of quality of care; these three fit variables were significant predictors, and the other six were not. Hence, results supported their being the most critical matches. Second, using only the three fit variables as predictors of quality of care yielded a significant regression equation ($\bar{R}^2 = .50$, $F = 9.98$, $p < .01$). These variables thus yielded a significant increment in \bar{R}^2 over the six technology and structure variables as separate predictors, and the three fit variables by themselves also yielded a higher \bar{R}^2 than the six technology and structure variables did together (.50 vs. .35), or than the three technology variables did alone (.50 vs. .40).

DISCUSSION

The results of this study supported the hypothesis that fit between technology and structure is a better predictor of workgroup performance than technology, structure, or technology and structure. The relationship between nursing subunit technology and quality of care was clearly strong and the relationship between nursing structure and quality of care was weak. Moreover, we found that the fit between technology and structure was an even better predictor of quality of care. This result was consistent with much previous research (Argote, 1982; Child, 1974; David et al., 1982; Dewar & Werbel, 1979; Schoonhoven, 1981; Woodward, 1965).

Certainly, the concept of fit needs much more work. The measurement of fit used in this study has had no previous empirical test. It does offer a simpler approach to the concept than either the interaction analysis of Schoonhoven (1981) or the residuals analysis of Dewar and Werbel (1979). Additional studies of this measure of fit should determine if it remains useful and appropriate in other settings. For example, would it be possible to use this difference measure if technology or structure were measured objectively? One problem would be insuring that the scales are of the same length. But one objective scale may be the number of pages in a report while another is a ratio measure involving two types of employees. Without an



underlying common metric, an absolute difference between the two measures would be meaningless. Standardization of scores before subtraction is one possible solution, but one that is not completely satisfactory unless the full range of variation for each variable is present in the data—a condition that is hard to guarantee. Thus it may be that the best possibility for using this difference measure is with subjective scales; clearly this area needs to be explored more fully. Future research should address another issue. Some controversy has arisen concerning the difference score approach (Johns, 1981) because it appears to lose data. However, since fit can only be measured by considering two variables simultaneously, the issue of losing data may actually be reversed in this case. The measure of fit proposed in this study is consistent with the general congruency model of Joyce and colleagues (1982) and the matching model of Schoonhoven (1981).

Future research should also continue to evaluate which dimensions of technology should be matched with which dimensions of structure. Results of this study suggest that the fit between variability and horizontal participation and the fit between uncertainty and formalization are important. More specifically, our results suggest that in nursing subunits where tasks and patient diagnoses vary widely, personnel should be highly involved in decision making and defining tasks. Conversely, in situations with little technological variability among patients, less horizontal participation will enhance the quality of nursing care.

For the fit between uncertainty and formalization, subunits with more complex nursing problems should require relatively more rules and procedures to provide quality care, and subunits with little uncertainty should use relatively little formalization. These results at first appeared inconsistent with Schoonhoven (1981) and Argote (1982), but a close analysis diminished this concern. Schoonhoven's measure of performance, severe morbidity, was quite different from the present study's measure, quality of nursing care. Morbidity is an outcome measure, and quality of care a process measure; hence, they should have different predictors. Argote's results indicated that programmed activities have a positive, though nonsignificant, correlation with quality of nursing care in contexts of both high and low uncertainty. It appears that subunits can best handle uncertainty associated with patient care by creating rules and procedures to manage this complex process. However, there is a need to verify these findings in other settings.

Overall then, this study suggested that the fit between technology and structure has real potential for enhancing understanding of the subunit design as related to subunit performance. The techniques employed in this study to define and measure the fit between technology and structure need further testing in organizational settings other than nursing subunits. If such future tests uphold our suggested fit relationships, scholars may be able to begin to resolve the controversy over how congruency relationships between technology and structure affect performance.

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APPENDIX

Structure Questionnaire

The structure questionnaire was developed from the 21-item questionnaire of Leifer and Huber (1977). The questionnaire included the following 12 items that loaded significantly on three factors. They were adapted to the nursing context by including instructions that "the term 'superior' refers to that individual or group of individuals who is/are your immediate supervisor(s) most frequently on your tour of duty (i. e., may be team leader, charge nurse, or head nurse)." Anchors for 5-point Likert scales were 1 = never, 2 = seldom, 3 = sometimes, 4 = often, 5 = always. Items that were reverse-scored in the analysis are indicated with an (R). The scoring was such that 1 = mechanistic structure and 5 = organic structure. Factor analysis confirmed which items loaded on the three scales of vertical participation (VP), horizontal participation (HP), and formalization (F).

1. I am not likely to express my feeling openly about my job. (HP) (R)
2. In this work group most people do not have a voice in decision making. (HP) (R)
3. I am encouraged to make suggestions in decisions relevant to my work. (VP)
4. I am encouraged to speak my mind on the job even if it means disagreeing with my superior. (VP)
5. My superior often seeks out my advice before decisions are made. (VP)
6. My job is not clearly defined. (HP) (R)
7. I have to check with my superior before I do almost anything. (VP) (R)

8. I do not share any influence with my superior in making decisions. (HP) (R)
9. The superior in this group usually makes the decisions himself/herself. (VP) (R)
10. There are rules and procedures for handling most kinds of problems which arise in making decisions. (F) (R)
11. I do not play an active role in making most decisions in my work group. (HP) (R)
12. The same rules and procedures are generally followed in making decisions. (F) (R)

Performance Instrument

The performance instrument developed by Hegyvary and colleagues (1979), contained 365 questions that draw data from patient records and from interviews with both patients and nurses. The instrument was completed by pairs of trained registered nurses. For any particular patient a subset of 8 to 41 questions was used. Sample questions follow:

From patient records—

1. Are descriptions indicative of mental-emotional state recorded at the time of admission to this unit? (Yes/No/Not Applicable)
2. In a nursing plan of care is there a statement about activities the patient is expected to do for himself and activities the nursing staff should perform for the patient? (Yes/No)
3. Does the record indicate that nurses have given attention to the patients' need for physical exercise in the past 8 days? (Yes/No/Not Applicable)

From patient or parent—

1. In the past two days have you/has your child needed some help in daily activities, such as bathing or doing things for yourself? (If yes), when you/your child needed some help, did someone assist you/your child within a reasonable amount of time? (Yes/No/Not Applicable)
2. Does the nurse knock or say hello before coming into your room? (Yes, all of the time/ Yes, a most of the time/ Yes, some of the time/ No)

From the nurse—

1. Have M_____ 's family been in to visit him/her in the past two days? (If yes), have any of the nurses spent some time with them to see if they have any particular fears or problems related to M_____ 's illness? (Yes/No/Not Applicable)
2. What is M_____ 's condition today, or his/her present status? (Yes/No, to determine if assigned nursing personnel are informed of the patient's status.

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SOURCES OF MOTIVATION TO CHOOSE EMPLOYEE OWNERSHIP AS AN ALTERNATIVE TO JOB LOSS

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Survey data from 943 supermarket-chain employees facing a shutdown indicated that those inclined toward employee ownership held stronger entrepreneurial and collective attitudes than other employees, had higher incomes, and were more likely to have already been laid off. The results of discriminant analyses showed that, contrary to the findings of previous studies, entrepreneurial and collective attitudes were generally more important determinants of differences between employees choosing employee ownership and other employees than situational factors.

The problem of plant closings and resultant job loss is a significant one throughout the nation, but it has reached alarming proportions in the industrial Northeast, the so-called frostbelt. There is little disagreement that the consequences of plant closings for communities and individuals are widespread and serious (Gordus, Jarley, & Ferman, 1981; Mick, 1975). Individuals and families confronted with job loss face several choices: fighting the closings or layoffs, collecting unemployment benefits, searching for new jobs in the same occupation, searching for different jobs, retraining, and relocation.

Employee ownership has grown in importance as an alternative that preserves jobs. "Almost unknown in the early 1970s, there are now perhaps 5,000 employee ownership plans, with two or three million participants. In addition, at least 250 companies of ten employees or more are majority employee owned" (Rosen, 1982: 7). Most employee ownership plans involve a minority of shares, but a few confer significant measures of employee control of companies as well.

This paper reports empirical data from an attempt to set up employee-owned-and-operated stores after a massive shutdown of supermarkets by one nationwide chain. It investigates sources of employees' motivations for selecting the particular alternative of a buy-out attempt in the wake of plant,

This report was a product of a research group organized under the auspices of Temple University's Institute for Public Policy Studies. Other group members who worked on this survey were Dr. Douglas Bennett, Political Science; Dr. Judith Goode, Anthropology; and Sally Leiderman, Sociology. Grants from Temple University and contributions from UFCW Local 1357, UFCW Local 56, and Super Fresh Food Markets, Inc. supported this research. We would like to gratefully acknowledge the helpful comments of Joseph Loewenberg, David Pierson, Gerald Zeitz, and three anonymous reviewers.

store, or office closings. Looking at motivations for choosing employee ownership in a buy-out situation (1) can help to determine the feasibility of employees supporting ownership as an alternative to job loss, and (2) also allows examination of the latent interest in worker participation that crises may arouse.

PREVIOUS RESEARCH ON EMPLOYEE OWNERSHIP

The employee-owned stores reported on in this paper are worker cooperatives. There are several other forms of employee-owned firms, each with somewhat different characteristics. O'Toole (1979) distinguished three categories: worker cooperatives, joint partnerships, and employee stock ownership trusts (ESOPs). Although this paper refers to literature pertaining to all types of employee ownership, its empirical data only cover the establishment of two worker cooperatives. The results therefore may not be entirely generalizable to attempts to set up other forms of employee ownership like joint partnerships or ESOPs.

Most previous research has been devoted to what O'Toole called the "record of employee ownership" (1979: 185). Studies have examined employee ownership's effects and outcomes on (1) employees' attitudes, such as satisfaction, commitment, and loyalty (Hammer & Stern, 1980; Long, 1978, 1979, 1982; Russell, Hochner, & Perry, 1979); and (2) on their performance and productivity (Conte & Tannenbaum, 1978). Some research has reported case studies of buy-out or rescue attempts that focus on the requirements for establishing employee-owned firms (Olson, 1982; Stern & Hammer, 1978; Stern, Wood & Hammer, 1979; Woodworth, 1982). These requirements include entrepreneurial, technical, and financial leadership; favorable responses from the parent corporations; institutional support; local communities favorable to the idea; favorable product markets; use of feasibility studies; union support; and mobilization of individual and organizational resources. A few observers (Cosyns & Loveridge, 1981; O'Toole, 1979) speculated that employee ownership is more suited to those who have a propensity to take risks. Cosyns and Loveridge also speculated that the formation of cooperatives or other employee-owned firms requires several other characteristics from participants: an ability to bear risks by having adequate resources, a propensity for self-control, an aptitude for teamwork, and an orientation toward collective action. Thus, both situational-economic factors and attitudinal factors may determine choice of employee ownership.

The literature has placed primary emphasis on the role of leadership in conversions to employee ownership. Comparatively little attention has been paid to the followers, those who choose employee ownership as a way to save their jobs. This paper looks (1) at the sources of supermarket employees' motivations to attempt this alternative, and (2) at their expectations as to what employee ownership would offer them.

Employee Motivations

Previous literature on reasons for choosing employee ownership has not addressed questions central to various theories of work motivation. In part,

the rarity and complexity of such choices make analysis that uses most need or reinforcement theories inappropriate. However, cognitive motivational approaches, which assume that people make choices on the basis of their beliefs about external situations and their evaluations of anticipated future events, seem appropriate for analyzing choices of employee ownership (Steers & Porter, 1979). Although we made no attempt to test specific cognitive motivation theories, two broad categories or sources of motivation usually used in this approach served to organize our efforts and this discussion. These sources of motivation were (1) individual situational factors, and (2) individual attitudes or evaluative belief.

Previous work on employee ownership has not directly addressed the issue of workers' motivations for choosing employee ownership and has not distinguished between situational and evaluative sources of motivation. Currently there is no body of theory concerning such motivations, merely a set of common-sense hypotheses. Most studies have tended to be speculative, ideological, or descriptive. The very few that have empirically examined this issue reported data gathered far after decisions to choose employee ownership had occurred. Hence, these studies are retrospective at best and may be biased by subsequent events and reinterpretations. The current study is the only report that concerns workers' motivations during the choosing period between shutdown and establishment of employee-owned firms.

Both individual situational factors and evaluative beliefs may be sources of employee motivation to establish employee-owned firms, but investigators in the United States have cited situational factors more often. They have also assumed that the prospect of unemployment, especially when there are few alternatives, is the typical situation that generates employee ownership. Recent cases cited occurred in areas of high unemployment or in rural or small towns where the plants shutting down were either the major employers in the area, or the largest employers, or the only ones. In such cases, employees see ownership as a last resort (Woodworth, 1982). In the study of one buy-out, Stern and Hammer (1978) asked employees their reasons for buying stock. Saving their jobs was the most frequently cited reason among both blue-and white-collar workers as well as among middle managers. Historical studies of the establishment of worker cooperatives seem to support the emphasis on employment as the primary contextual factor. For instance, Shirom (1972) concluded that the establishment of worker cooperatives has occurred in waves corresponding to periods of high unemployment.

The situation of unemployment does not clearly explain individuals' motivations. However, it seems likely that workers more prone to unemployment because of low skill levels, low seniority, minority group status, and low education would be more inclined to favor worker buy-outs as a means of avoiding unemployment. Studies of job displacement resulting from plant closings show that workers with these characteristics are less prone to find new jobs quickly and are less geographically mobile in searching for new jobs (Gordus et al., 1981). Thus, these workers might positively value saving the jobs they already have through worker buy-outs or some other means.

Reports have also cited attitudes and beliefs as reasons for establishment of employee-owned firms. These tend to fall into two categories—entrepreneurial ideals and collective ideals. Entrepreneurial ideals, as used in this paper, include (1) aspirations for individual upward mobility, with the American Dream of self-employment as a goal (Shirom, 1972); (2) increasing efficiency in organizations through increased motivation deriving from ownership (Long, 1978); and (3) making more money through profits and wages (O'Toole, 1979). Collective ideals include (1) establishing alternative values (Rothschild-Whitt, 1979); (2) solving problems through increased participation or organizational democracy (Bernstein, 1980; Stern et al., 1979); and (3) reforming or eliminating capitalism (Kelso & Adler, 1958; Shirom, 1972). In this paper, the concept of collective ideals refers to valuing collective employee participation in decision making. In the United States, however, workers have usually chosen collectivism in the form of collective bargaining. This form of collective action may include attempts to save jobs with such methods as wage concessions or, in plant relocations, job transfer rights. Compared to collective bargaining, establishing employee ownership has been an unusual collective action because employee ownership requires a difficult, large scale mobilization of many people, rather than action by a few union leaders. Of course, employee ownership is something that employees may choose when collective bargaining has failed to save jobs, but American unions have historically been skeptical of the option, especially when management employees are the first to think of it.

Very few empirical studies exist that have tried to establish the relative levels of importance of situational and attitudinal sources of motivation for employee ownership. However, those that do exist seem to point to situational factors as the more important. Previous studies have also suggested that individual entrepreneurial ideals are more important in the United States than collective ones. Using historical records and case studies from 1880 to 1935, Shirom (1972) concluded that collective ideals were sometimes present as motivations for starting worker cooperatives in Europe but were lacking in the United States. He argued that fears of downward mobility and aspirations for individual, entrepreneurial success had motivated some workers to form cooperatives in the past. In a more recent, in depth case study, Stern and Hammer (1978) found that such collective ideals as belief in employee ownership or belief in participation in decision making were much less salient reasons for employees than the situational reason of saving jobs. However, different groups of workers may have different motivations. Stern and Hammer found, for instance, that white-collar employee-owners in their sample were more likely than blue-collar employee-owners to cite beliefs in collective ideals as a motivations.

Typically, the literature has emphasized one source of motivation as the most important, by implication minimizing the others. However, this study explored the contributions of (1) situations, (2) entrepreneurial ideals, and (3) collective ideals. The research took place in the immediate wake of a shutdown decision, after the unions had put before the workforce the idea of

using employee ownership to save jobs. Thus, this study was a unique opportunity both to explore workers' motivations for choosing worker ownership and to develop theory on this issue.

Hypothesis

The following hypotheses served to focus our examination of the sources of workers' motivations for choosing employee ownership:

Situational Factors.

Hypothesis 1: Job saving. Workers who choose employee ownership are more likely to be actually unemployed than workers who do not choose it.

Hypothesis 2: Barriers to mobility. Workers with personal or situational characteristics that are generally associated with post-shutdown job immobility are more likely to choose employee ownership than those with characteristics associated with some mobility. Low income, low skill level, low seniority level, owning a home, being married, and having a family might all be barriers to mobility.

Individual attitudes and beliefs.

Hypothesis 3: Entrepreneurial ideals. Workers choosing employee ownership are more likely to adhere to ideals of profit-making, ownership, and efficiency than workers not choosing employee ownership.

Hypothesis 4: Collective or participative ideals. Workers who choose employee ownership are more likely to adhere to ideals of worker participation in organizational decision making than workers who do not choose employee ownership.

Hypothesis 5: Situational factors will be the strongest sources of motivation for choosing employee ownership, followed by entrepreneurial ideals. Collective ideals will be the weakest.

Research Setting

In accordance with contract provisions, in March 1982, The Great Atlantic and Pacific Tea Company, Inc. (A&P) gave their union three weeks notice that they intended to close over 40 Philadelphia area stores. Local 1357 of the United Food and Commercial Workers (UFCW) quickly responded by obtaining pledges of \$5,000 from each of 600 employees to buy as many as 21 stores and reopen them as employee-owned enterprises. While negotiations continued, A&P actually closed most area stores, putting 2,000 employees out of work.

In late May, A&P, UFCW Local 56, representing meatcutters, and UFCW Local 1357, representing retail clerks, agreed on a new contract. A&P agreed to permit employees to immediately buy and operate as many as four stores as employee-owned enterprises. Two such stores were open later in 1982. A&P also agreed to reopen 20 to 24 stores under a new subsidiary, Super Fresh Food Markets, and to recall A&P employees to these stores. A&P agreed to three other conditions: (1) to set up a quality of work life (QWL) program in Super Fresh involving employees in managerial decision making, (2) to give Super Fresh employees right of first refusal to purchase any stores closed in the future, and (3) to create a fund from the profits of Super Fresh to help employees purchase more stores. In exchange, the unions agreed to give up \$2/hour in the base wage rate and to cut many seniority-related benefits, such as vacation time. The unions did not give up seniority benefits relating to job security, and the pension plan was not changed.

By the middle of the summer of 1982, when we collected the data for this study, union members had several possible options for their post-A&P future: (1) employment in a Super Fresh with a QWL program that would open in August; (2) employment in one of two employee-owned stores that would open in October; (3) other employment; (4) unemployment; or (5) withdrawal from the labor market.

This study is part of an ongoing longitudinal examination of the consequences of these events. This report focuses on the motivations, particularly economic situations and individual attitudes, associated with choice of the employee-ownership option.

METHODS

With the approval and support of UFCW union Local 1357, UFCW Local 56, and Super Fresh management, we conducted a mail survey to gather data from the men and women who had been employed by Philadelphia-area A&Ps at the time of the store closings.

The pragmatic opportunity afforded to do research in the midst of the process—while workers were deciding on the alternatives before them—meant that our research had to be swiftly executed. Furthermore, the relative lack of previous theory and empirical research about workers' choices concerning employee ownership meant that we had to adapt survey items from other studies or invent them. Thus, the research did not have enough time to precisely construct and pretest scales to measure all relevant constructs. However, knowledge of the employee-ownership literature enabled the research team to include items in the questionnaire relating to key characteristics that this literature has addressed.

An instrument was developed that included questions used by previous researchers as well as items specific to this situation. The research team conducted a focused discussion group with a group of employees in order to determine which issues were most salient, to refine the wording of potential questions, and to insure that response choices were relevant for the subjects.

The final instrument contained original questions about reasons for pledging money to the employee-ownership plan, satisfaction with the union contract, and demographics. In addition, we used questions on working conditions that came from the Michigan Quality of Employment Survey and derived questions on actual and desired influence hierarchies in stores from Tannenbaum (1968).

In July 1982, questionnaires were sent to all 1,528 members of Local 1357 who had been employed by A&P and to a random sample of half (421) of the A&P employees in Local 56.¹ Three follow-up mailings went out after the questionnaires. Targeted follow-up was made possible by number-coding the questionnaires. Heberlein and Baumgartner (1978) noted that respondents may see number-coding as an invasion of privacy, and this may have depressed the overall response rate. Of the 1,949 questionnaires mailed out, respondents returned 1,143, for an overall response rate of 59.8 percent. After coding, we deleted 20 cases because of missing data. Also, due to a clerical error, 180 questionnaires were destroyed in an apparently random way. The remaining 943 cases that form the basis for the results reported here represent 49.4 percent of the mailed questionnaires. We are currently conducting a telephone survey of both nonrespondents and those whose questionnaires were lost. On the basis of a comparison between respondents' demographics and union composition as reported by union officials, it appears that the sample upon which we based our analysis was representative.

The sample was 97 percent white, 65 percent married, and 41 percent female. Eighteen percent had less than high school educations, and 50 percent were high school graduates. Their average annual household income was \$20,000 for a household of three.

Pledge Status

For the purpose of this report, the respondents were divided into three primary groups: (1) pledgers, those who had pledged \$5,000 to the employee-ownership plan and had put up \$200 immediately; (2) intenders, those who indicated that they planned to pledge sometime in the future; and (3) nonpledgers, those who indicated that they did not intend to pledge. Pledgers made up 18.8 percent of the respondents ($n = 177$); intenders were 8.6 percent ($n = 81$); and nonpledgers were 64.1 percent ($n = 604$). We could not classify the remaining respondents ($n = 81$) because of missing data in their questionnaires.

Scales

Survey questionnaire items were factor analyzed with varimax rotation to form scales that were expected to mirror the constructs implicit in the employee-ownership literature and available from the data. The factors that resulted showed very close fits between groups of items selected to represent key issues in the literature and particular constructs important in this study.

¹Only half of the employees in Local 56 were sampled because of budgetary limits.

The numbers in Table 1 in the factor columns are factor loadings. We constructed the scales using the following criterion: an item had to have a loading of at least .40 on its main factor and no higher than a .25 loading on any other factor.

One series of questions derived from the focused group discussion asked about the advantages and disadvantages of the employee-ownership plan. These items factored into two scales that fit two aspects of the entrepreneurial ideals: ownership and risk aversion. Ownership included seven reasons to participate in the worker-ownership plan. These were profit sharing, independence, being an owner, individual decision input, decision-making efficiency, importance of work, and sharing responsibility. Ownership was a reliable scale (standardized item $\alpha = .86$). Risk aversion included three reasons not to participate in the plan: just wanting to earn a pensioned leave, wanting to avoid blame for mistakes, and not wanting responsibility. Risk aversion was also a reliable scale (standardized item $\alpha = .64$).

Three sets of items related to the construct of collective ideals covered worker participation, union contracts, and feelings about the unions. One series of questions derived from previous literature on worker participation (Tannenbaum, 1968) concerned how much say or influence workers should have in six store decisions: shutting a store, purchasing equipment, hiring and firing managers, hiring and firing workers, assigning jobs, and scheduling breaks. These items loaded on a single factor that we called worker participation; it was also a reliable scale (standardized item $\alpha = .82$). A second series of questions concerned workers' evaluations of the following innovative conditions in the Super Fresh contract: employees' inputs to decisions, employees' rights to buy out closing stores, and a fund from Super Fresh revenues to help finance employee buy-outs. These formed a single factor and a reliable scale called contract (standardized item $\alpha = .80$). The third area, composed of a single question on the union's perceived importance as a protector of workers' interests, did not load on any of the other factors; we included it as a separate variable, perceived union importance.

Tests

For Hypothesis 1 through 4, two types of statistical tests were performed, with the choice depending on the type of data used. For categorical variables, we used chi-square tests. For continuous or ordered variables we generated a priori contrasts among the three pledge-status groups using *t*-tests. For all tests, $p < .05$ was the criterion for accepting the hypotheses. For conceptual clarity, we have grouped variables in the tables according to the hypothesis that was tested, rather than according to the type of test performed. Therefore, at times the same tables report both chi-square tests and *t*-tests.

RESULTS

This study hypothesized that two main sources of motivation contribute to workers' choosing to participate in employee-ownership plans. These

TABLE 1
Factor Structure^a of Items Used in Survey Relevant to Entrepreneurial and Collective Ideals

Items	Ownership	Worker Participation	Contract	Risk Aversion	Communalities
Perceived union importance	.109	.053	.255	.135	.084
Desired worker say over					
Shutting the store	.093	.565	.112	.123	.356
Purchasing equipment	.101	.613	.064	-.023	.391
Hiring/firing managers	.080	.797	.086	-.025	.650
Hiring/firing workers	.091	.757	.033	-.080	.589
Assigning jobs	.093	.702	.037	-.008	.503
When to take breaks	.049	.523	-.015	.115	.289
Evaluation of contract provisions					
Fund for employee buyouts	.168	-.011	.783	-.031	.643
Employee buyout rights, first refusal	.152	.086	.775	-.125	.648
Employee input to decisions (QWL)	.197	.149	.679	-.202	.564
Reasons to participate or not in plan					
Profit-sharing	.723	.025	.201	.026	.565
Independence	.560	.169	.105	.184	.387
Not wanting responsibility	.127	.003	-.009	.663	.457
Being an owner	.829	.038	.145	.009	.710
Individual decision input	.885	.140	.095	-.006	.813
Decision-making efficiency	.768	.162	.042	.002	.619
Avoid blame for mistakes	.142	.047	-.000	.696	.506
Just earn a pensioned leave	-.018	.017	-.139	.523	.293
Importance of work	.415	.049	.158	.230	.253
Sharing responsibility	.505	.068	.126	.075	.281
Eigenvalues	4.548	2.273	1.770	1.018	
Percent of common variance	47.3	23.7	18.4	10.6	100.0
Percent of total variance	24.9	13.3	11.3	7.5	57.5

^a Varimax rotation was used.

sources are (1) situational factors, which we divided into the categories of job saving and barriers to mobility, and (2) attitudes and beliefs, which we divided into entrepreneurial ideals and collective or participative ideals.

For hypothesis testing, the main comparison groups were the pledgers and the nonpledgers. In addition, for some descriptive purposes we broke intenders out of the nonpledgers category as a special subgroup, because the intenders helped to clarify why some of the nonpledgers did not pledge.

The data shown in Table 2 pertain to the situational factors. The first part of the table compares the employment statuses of the three groups at the time of the survey. The data appear to confirm Hypothesis 1. Pledgers were significantly more likely to be actually unemployed than nonpledgers. Curiously, intenders tended more often than pledgers to be unemployed.

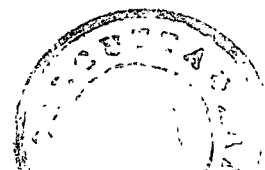
Table 2 also presents data concerning personal and situational characteristics related to barriers to mobility. Hypothesis 2 predicted that employees with low incomes, low skills, low seniority levels, and so forth, would be more likely to choose employee ownership. The results were inconclusive. Pledgers reported significantly higher levels of personal income than nonpledgers, but nonpledgers were older, had more seniority in their last

TABLE 2
Indicators of Situational Contexts for Pledgers, Nonpledgers, and Intenders

Context Variables	Group			χ^2
	Pledgers (n = 175)	Intenders (n = 80)	Nonpledgers (n = 604)	
(a) Employment Status at Survey Time				
Percent unemployed	44.6	52.5	34.5	13.3*
Percent employed	55.4	47.5	65.4	
(b) Barriers to Mobility				
Mean age	38.0 ^a	36.0 ^b	41.3 ^{a,b}	0.3 1.01 20.7* 10.2*
Mean number of years as an A&P employee	16.0 ^a	12.4 ^{a,b}	17.3 ^b	
Mean number of years in last A&P job	11.0 ^a	10.9 ^b	14.4 ^{a,b}	
Mean number of years of education	13.7	13.6	13.8	
Percent men	67.0	65.8	65.4	
Percent supervisory status	26.7	21.2	26.3	
Mean personal annual income	\$17,140 ^{a,b}	\$12,452 ^{a,c}	\$15,647 ^{b,c}	
Mean household annual income	\$23,984	\$20,475	\$22,288	
Mean household size	3.3	3.2	2.9	
Percent married	66.9	55.1	70.5	
Percent homeowners	72.1	60.7	74.0	

^{a,b,c} Values with the same superscript are significantly different ($p < .01$) as indicated by t-test contrasts.

* $p < .01$



A&P jobs, and were more likely to be married than nonpledgers. On 4 of the 11 measures the two groups did not differ. Perhaps the most conspicuous findings concerned the intenders, those who did not choose employee ownership but also did not totally reject it. Intenders had the highest rate of unemployment and the most barriers to mobility. Consistent with their comparatively limited financial resources, between 60 and 70 percent of the intenders reported that they would be more likely to pledge if the cost were reduced.

The results discussed thus far seemed to support the idea that situation is important in decisions concerning choice of employee ownership, though it is important in a somewhat unexpected way. Escaping unemployment was an important source of motivation, but having adequate resources—as pledgers did—was an important enabler. Intenders had high unemployment, which favored choice of employee ownership, but they also had low resources, which inhibited it. Nonpledgers were not inhibited by sheer lack of funds, but neither were they likely to be unemployed.

Hypothesis 3 predicted that adhering to entrepreneurial ideals would favor choice of employee ownership. The findings in Table 3 appear to confirm this hypothesis strongly. Pledgers gave significantly higher ratings

TABLE 3
Entrepreneurial and Collective Ideals by Pledge Status

Measures of Ideals ^a	Group		
	Pledgers (<i>n</i> = 175)	Intenders (<i>n</i> = 80)	Nonpledgers (<i>n</i> = 604)
Ownership scale	3.55 ^b	3.47 ^c	3.06 ^{b,c}
Risk aversion scale	1.75 ^b	1.81 ^c	1.99 ^{b,c}
Worker participation scale	2.98 ^{b,c}	2.72 ^b	2.68 ^c
Contract scale	3.32 ^b	3.35 ^c	2.97 ^{b,c}
Perceived union importance	3.29 ^b	3.24	3.02 ^b

^aFour-point scales, with 1 = low, 4 = high.

^{b,c}Values with the same superscript are significantly different ($p < .01$) as indicated by *t*-test contrasts.

than nonpledgers did on the ownership scale, composed of reasons to participate in the plan. Pledgers also gave lower ratings on risk aversion than nonpledgers did. Intenders were generally similar to pledgers in their ratings.

Hypothesis 4 predicted that collective or participative ideals would be sources of motivation for choosing employee ownership. Previous studies found these ideals to be weak or absent among employee-owners, though theoretically of potential importance. As shown in Table 3, pledgers had significantly higher scores on perceived union importance and on the contract scale than nonpledgers, and also had significantly higher scores than

nonpledgers on the worker participation scales. These findings tended to confirm Hypothesis 4.

Hypothesis 5 predicted that situational factors would be most important, entrepreneurial ideals second most important, and collective ideals relatively least important in motivating employees to become owners. To test this hypothesis we performed discriminant analyses involving pledgers and nonpledgers and derived a single function. We merged intenders and nonpledgers—behaviorally they were all nonpledgers, and behavioral differences are required to discriminate between groups (Eisenbeis, 1977). We entered 17 variables into the analysis: (1) 12 indicators of personal and situational characteristics; (2) the 2 scales representing entrepreneurial ideals, ownership and risk aversion; and (3) 3 measures representing aspects of collective or participative ideals, the worker participation scale, the contract scale, and the perceived union importance. Table 4 shows results.

These results did not support Hypothesis 5. Although the relative strength of any variable's discriminating power is a controversial issue in the literature (Eisenbeis, 1977), several indicators did not confirm the hypothesis. First, concerning the order of entry into the discriminant analysis (Eisenbeis, 1977), the ownership variable entered first, then risk aversion, worker

TABLE 4
Results of Discriminant Analysis between Pledgers
and Nonpledgers

Step	Variable Entered ^a	Wilk's Lambda	Change in Rao's V	Standardized Discriminant Function Coefficient
1	Ownership	.941	38.66***	.592
2	Risk aversion	.903	27.44***	-.469
3	Worker participation	.891	9.33**	.342
4	Annual income	.881	7.29**	.513
5	Employment status	.868	10.73**	-.385
6	Job seniority	.861	5.91*	.350
7	Perceived union importance	.856	3.78*	.204
8	A&P seniority	.855	1.26	.328
9	Age	.852	2.33	-.289
10	Education	.850	1.23	-.119

Group Centroids

Nonpledgers	-.217
Pledgers	.809

Canonical discriminant function: $\chi^2 = 98.65$; $df = 10$; $p < .001$; canonical $r = .387$

Percent of cases correctly classified: 81.9% (chance is 79.5%)

^aSeven other variables were too weak to enter.

* $p < .05$

** $p < .01$

*** $p < .001$

participation, and only then indicators of individuals—personal and situational characteristics. Perceived union importance was also a significant discriminator, though less important than income, employment status, and job seniority. The contract scale was not significant and did not enter into the discriminant function. Second, the change in Rao's V (Nie, Hull, Jenkins, Steinbrenner, & Best, 1975) followed the same pattern as the order of stepwise entry and indicated that only three of the nine sources of contextual factors were significant discriminators, whereas four of five attitude measures were significant.

It is possible that variations in measurement errors between broad, objective, situational factors and specific, subjective attitudes might account for the findings of the discriminant analysis reported in Table 4. To explore this possibility we substituted six questionnaire items concerning individuals' perceptions of their economic statuses for the objective situational measures in another discriminant analysis. These items, which did not form a reliable scale, were: perceived likelihood of pledging for worker ownership if the pledge amount were lowered; perceived likelihood of pledging if there were no cost to pledge; perceived fairness of pay; perceived economic status relative to parents; perceived importance of main job; and perceived importance of earning extra money. Substitution of these items in the analyses did not substantially change the results. Overall, situational factors, whether objectively reported or perceived, did not appear to have greater importance than attitudes.

DISCUSSION

This study's analyses clearly established that workers who chose to participate in employee ownership differed from nonparticipants in both situational factors and individual attitudes. First, pledgers seemed to differ greatly from nonpledgers in having a higher rate of unemployment and greater financial resources. Second, pledgers placed more value on entrepreneurial ideals than did nonpledgers. Third, pledgers expressed more belief in collective or participative ideals like worker participation than did nonpledgers. Thus, although this study confirmed the importance of situational factors and entrepreneurial values, which previous studies have emphasized, it also strongly indicated the significance of collective or participative ideals, which previous researchers have ignored or questioned.

When the relative importance of each source of motivation was examined in this sample, entrepreneurialism—risk-taking, profit-seeking, American Dream ownership—appeared primary. Comments from the focused discussion used to construct the questionnaire exemplified this finding; for instance "I always wanted the chance to own my own business, I just never had the opportunity before." The contextual factor, job saving, which Shirom (1972) and Hammer and Stern (1980) reported as significant, was less important in this case; some alternative jobs were available in Super Fresh. Of course, this relative ranking might change in other cases in which employee ownership is the only alternative in town.

Furthermore, the findings presented here clarify situational factors related to employee ownership. First of all, although the threat or the experience of unemployment may incline workers toward employee ownership, their personal financial resources may either enable or inhibit them from choosing it. Apparently, both the inclining force of unemployment and the enabling force of resources must be present. These findings support the speculations of Cosyns and Loveridge (1981) on the need for employee owners to have both risk-taking and risk-bearing abilities.

Second, although pledgers and nonpledgers did not differ in gender, education, supervisory status, or household income, the older nonpledgers may have been disinclined to employee ownership because they were the last actually to be laid off, the closest to retirement, and the least able and least inclined to take career risks. Both these situational factors and risk aversion may disincline some older workers from employee ownership.

The most striking finding concerned attitudes toward an expanded role for employees in workplace decision making, or collective or participative ideals. Results from these workers did not corroborate previous reports that have denigrated the importance of collective ideals. Rather, worker participation outranked all situational indicators in relative discriminating power. It appears likely that saving jobs may have been the initial attraction of employee ownership but that the opportunity to influence decisions tapped existing dissatisfaction with previous jobs. The level of collective ideals that pledgers expressed pointed to a greater interest in workplace reform than is generally recognized among American workers. Perhaps if there were more opportunities than presently exist, more of these workers would be interested. Similarly, if there were no monetary barriers to membership,² and if knowledge about running businesses were more widely disseminated, more workers would be interested than have been.

However, the predominance of attitudinal over situational factors should not be accepted without a caveat. It is possible that entrepreneurial and collective attitudes are not stable. The degree to which action mobilizers in shutdown situations appeal to such attitudes, changes in social norms, and even situational factors may influence the extent of entrepreneurial and collective attitudes. In this study, analyses of the attitudes of both pledgers and nonpledgers showed few differences between those who had attended Local 1357's informational meetings about the work-ownership plan and those who had not attended. Thus, it may be possible to rule out some informational influences on attitudes here. Nevertheless, information, social norms, and therefore attitudes may differ in other situations; they might even differ among this group of workers in the future.

Can these findings be generalized to workers in other situations? This study's focus on supermarket employees prevents easy generalization to other industries. Its focus on the cooperative form of organization may limit generalization to other forms of employee ownership, such as ESOPs.

²Ellerman (1975) advocated this idea.

However, this case does illustrate the applicability of the ideas of employee ownership to the service sector, whereas almost all previous studies have concerned the manufacturing sector.

Several institutions and organizations—for instance, governments, managements, unions—stand to benefit from the close examination of how workers respond to threatened job loss. Financial and technical assistance, education, and labor-management cooperation in plant shutdowns might be able to mobilize many workers who wish to share in ownership and managerial decision making. In the case studied it was too early to tell if the sources of motivation we explored actually led to effective actions, because we conducted the survey before employees actually made their choices. Thus follow-up study of workers faced with shutdowns is also important; such research is underway in this case.

In general, the empirical findings presented here suggest that collective or participative ideals, along with situational factors and entrepreneurial ideals, may have important roles to play in the establishment of employee ownership. Such results bolster the validity of previous researchers' and commentators' emphases (Bellas, 1972; Rothschild-Whitt, 1979; Zwerdling, 1980) on the key roles of worker participation, workplace democracy, and alternative forms of authority in existing employee-owned firms. Moreover, our results suggest that American workers may differ from their European counterparts not so much in their individual evaluative beliefs, but rather in the opportunities they have to tap their inclinations.

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TASK PERFORMANCE, PERCEIVED COMPETENCE, AND ATTRIBUTED CAUSES OF PERFORMANCE AS DETERMINANTS OF INTRINSIC MOTIVATION

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Volunteer subjects engaged in a task that was highly intrinsically motivating under three conditions: no pay, fixed reward, and performance-contingent reward. Results indicated that extrinsic rewards had no effect on either behavioral or self-reported measures of intrinsic motivation, or upon two intervening variables, perceived competence and attributions. As hypothesized, level of task performance was significantly related to perceived competence and attributions, which were in turn significantly related to measures of intrinsic motivation. Locus of control was significantly related to external attribution of the causes of task performance.

There are many potential sources of conflicting findings concerning intrinsic motivation. The present study sought to clarify some of these difficulties by focusing on the following primary issues: (1) the need for adequate direct measures of two hypothesized intervening constructs, perceived competence and causal attributions; (2) the differential effects of extrinsic rewards that are contingent upon levels of task performance and of rewards that are contingent only upon engaging in activities; and (3) the need to clarify the characteristics of the dependent measures of intrinsic motivation that are subject to undermining effects.

PRIMARY ISSUES AND HYPOTHESES

Direct Measures of Competence and Attributions

Researchers have generally hypothesized two intervening mechanisms whereby extrinsic rewards influence intrinsic motivation. First, when rewards enhance feelings of personal competence or self-efficacy, they may increase intrinsic motivation (Bem, 1972; Staw, 1976). Second, when rewards cause individuals to attribute their behaviors to external rather than internal sources, rewards may decrease intrinsic motivation (Deci, 1971, 1975). For the most part, previous studies have invoked these intervening variables, perceived competence and attributed causes of performance, to explain results, but

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have not directly measured them.¹ In addition, individuals' generalized expectancies regarding internal or external locus of control (Rotter, 1966) may influence hypothesized attribution processes; thus, this study included a measure of this variable in its investigation of the effects of extrinsic rewards on intrinsic motivation.

Reward Contingency

Theoretical positions have varied regarding effects of two types of extrinsic rewards on intrinsic motivation. The first type are rewards that are contingent upon only engaging in activities. The second type are rewards that are contingent upon attaining certain levels of task performance. Deci (1975) has argued that rewards that are contingent on performance levels should have the stronger undermining effect, since such rewards strongly imply to individuals that they engage in behaviors to attain rewards, rather than because the behaviors are of intrinsic interest. On the other hand, social learning theory would predict that extrinsic rewards that are contingent on performance levels will enhance intrinsic motivation. Bandura argued that "the development of self-motivation and self-direction requires certain basic functions that are developed through the aid of external incentives" (1976: 104) and that "the capability for evaluative self-reinforcement is established partly through the influence of extrinsic reinforcement" (1976: 106).

Empirical results have been just as contradictory as these theoretical positions. Some investigators have observed decreases in intrinsic interest or motivation following administration of rewards that were contingent only upon engaging in activities (Calder & Staw, 1975; Kruglanski, Freedman, & Zeevi, 1971). Others have observed such decreases following administration of rewards contingent on performance levels (Deci, 1971; Pritchard, Campbell, & Campbell, 1977). Still others have failed to observe decreases with either type of reward (Farr, 1976; Farr, Vance, & McIntyre, 1977; Phillips & Lord, 1980). Relatively few investigators (Deci, 1972; Farr et al. 1977; Harackiewicz, 1979) have simultaneously compared, in the same study and with the same task, the relative effects of no rewards, rewards contingent upon only engaging in activities, and rewards contingent upon levels of task performance.

Characteristics of Dependent Measures

Two studies (House, 1971; House, Shapiro, & Wahba, 1974) distinguished between the intrinsic valence of engaging in behaviors and the intrinsic valence of accomplishment associated with attaining a certain level of performance. Self-reports concerning intrinsic interest in activities and enjoyment of activities can measure the valence of engaging in behaviors. Behavioral measures of motivation are influenced by both valences, as well as by individuals' expectancies that engaging in behaviors will result in achieving given levels of performance, and by their expectancies of attaining valued extrinsic outcomes as a result of their achievements.

¹Two exceptions are Arnold (1976), who measured task competence, and Phillips and Lord (1980), who measured perceived competence and attributions.



Theoretical statements regarding hypothesized effects of extrinsic rewards on intrinsic motivation have not clearly specified whether the undermining effect of extrinsic rewards should operate upon the intrinsic valence of engaging in behavior, the intrinsic valence of accomplishment, or both. A number of studies that have found evidence supporting the undermining hypothesis have employed only self-reported measures of levels of intrinsic motivation, such as statements concerning enjoyment of task, interest in activities, and willingness to engage in activities again in the future (Calder & Staw, 1975; Hamner & Foster, 1975; Kruglanski, Riter, Amitai, Margolin, Shabtai, & Zaksh, 1975). Those studies that have employed behavioral measures of intrinsic motivation—measures influenced by the valences of both behavior and accomplishment—have generally observed extremely small samples of subjects' behavior. For example, Deci (1971) observed free choice behavior for only eight minutes.²

This research employed a combination of self-reported measures and measures based on samples of actual behavior collected over longer time periods than previous studies have used. The objective was to increase confidence in the stability of observed effects and to provide a sound basis for generalization of results.

Hypotheses

This study was designed in light of the preceding considerations with three ends in view. First, it would directly assess both subjects' perceptions of their levels of task competence and their attributions of the causes of their performance. Second, it would employ an activity that was highly intrinsically motivating in conjunction with three reward conditions: (1) no reward, (2) reward contingent upon engaging in the activity, and (3) reward contingent upon level of task performance. Finally, the study would incorporate a variety of dependent measures of intrinsic motivation, including longer-term behavioral measures than had figured in previous research.

With such a research design, this study's results should cast light on the validity of the various competing positions and explanations outlined earlier in this paper. In addition, the design yields data that permit tests of the following specific hypotheses:

Hypothesis 1: When accurate performance feedback is available, levels of task performance will significantly influence perceived competence and attributed causes of performance.

Hypothesis 2: Individuals with internal loci of control will tend to attribute their level of performance to personal factors, and individuals with external loci will tend to attribute their performance to situational or chance factors.

²Other studies on this topic have employed similarly short time periods for behavioral samples, including Pritchard and colleagues (1977), ten minutes; Farr and colleagues (1977), eight minutes; and Fisher (1978), ten minutes.

Hypothesis 3: Increased feelings of personal competence and internal attributions of causes of performance will increase intrinsic motivation; decreased feelings of competence and external attributions will decrease intrinsic motivation.

METHODS

Task

The task employed in the research was an interactive Star Trek computer game, which subjects played seated at video computer terminals. Subjects played the role of captain of the starship *Enterprise*; their mission was to destroy as many enemy starships as possible. Subjects could alter the course and speed of the starship, raise and lower defensive shields, deploy several types of offensive weapons, and request a variety of status reports regarding their own craft and the positions of the enemy. At the beginning of each mission, the computer told subjects how many enemy starships had invaded the galaxy. At the end, it displayed the number of enemies destroyed, as well as a performance score based on the percentage of enemies destroyed during the mission.

Subjects

The subjects in the study were 42 undergraduates at the University of Toronto who were recruited through advertisements placed in the campus newspaper and posted around the campus. The advertisements stated that students interested in participating in a study of person-computer interaction could play an exciting Star Trek computer game free of charge. Individuals who phoned were informed of certain conditions of participation and were scheduled for participation if they were willing to meet these conditions; they also had a chance to ask questions.

Procedure

The design required subjects in each experimental condition to volunteer for three one-hour sessions on separate days over a one-week period; sessions were scheduled at times convenient for the students. The game was available from 9:00 A. M. to 9:00 P. M. Monday through Thursday, and from 9:00 A. M. to 5:00 P. M. Friday, Saturday, and Sunday. Subjects were randomly assigned to experimental conditions when they were scheduled without regard to gender. The experimental conditions were: (1) no reward, in which subjects received no pay whatsoever; (2) fixed reward, in which subjects were paid \$5 per session; and (3) contingent reward, in which subjects were paid 50 cents for each enemy starship destroyed. Pretest data indicated that on the average individuals could destroy approximately ten enemy starships in one hour of play.

In order to eliminate potential subject contamination and perceived inequity, the study ran trials of the no-reward condition first, then the fixed-

reward condition, and then the contingent-reward condition. Thus, subjects in the no-reward condition could not feel inequitably treated. The no-reward condition was run during the fifth week of the spring semester, the fixed-reward condition during the eighth week, and the contingent-reward condition during the tenth week.³ Volunteers were accepted until eighteen individuals had been scheduled for each of the three conditions. Experimenters telephoned all subjects once one or two days before their first scheduled sessions to remind them of their appointments. This was done because of the long time lag between volunteering and their first session for subjects assigned to the fixed-reward and the contingent-reward conditions. The study only used data from subjects who attended and completed all three scheduled sessions. Two subjects assigned to the no-reward condition failed to appear for any sessions, resulting in 16 in this condition. Two subjects assigned to the fixed-reward condition failed to appear for any sessions; two appeared for one session only; and results for one subject were lost through computer malfunctions, resulting in 13 subjects in this condition. There were also 13 in the contingent-reward condition, because three failed to appear for any sessions, and the computer lost results for two. Subjects in the no-reward condition were all men; the fixed-reward condition included 12 men and one woman; and the contingent-reward conditions had nine men and four women.

Upon arriving for their first sessions, subjects received manuals explaining the nature of the game, the commands available, and the general strategy of the game. They had about 15 minutes to familiarize themselves with the manual; an experimenter then answered any questions and showed them how to use the computer video terminals. Subjects then played the game for the remainder of the scheduled hour. There were two terminals set up in a single large room with a partition; two subjects playing simultaneously could neither observe one another nor interact.

Three women and two men graduate management students served as experimenters. Experimenters had received detailed instructions and training to ensure their identical treatment of subjects; this training had put special emphasis on their refraining from giving subjects any form of positive or negative evaluative feedback on their performance. The experimenters were all blind to the experiment's hypotheses and were not familiar with the literature on effects of extrinsic rewards on intrinsic motivation.

Manipulation of Reward Conditions

None of the subjects had volunteered with any expectation of receiving financial rewards. Subjects in the no-reward condition in fact received no

³The 13-week spring semester has a one-week vacation following its sixth week and many midterm examinations in its seventh week; final examinations begin one week after the end of classes. Thus, scheduling for this study tried to minimize the likelihood that subjects in different conditions felt differential external demands. Further, if subjects run later in the semester did suffer more external demands than those run earlier, this bias would have worked to support the undermining hypothesis.

payment. When subjects in the fixed-reward condition arrived for their first sessions, the experimenter told them that the professor conducting the research had recently received a grant making it possible to pay every individual \$5 for each of the three scheduled sessions. Each then received \$5 in cash at the end of each session. The experimenter told subjects in the contingent-reward condition when they arrived for their first sessions that the recent receipt of a research grant made it possible for them to be paid 50 cents for each enemy starship they destroyed. Experimenters kept records of numbers of enemies destroyed during missions and paid subjects in cash at the ends of sessions. The minimum total pay received for the three sessions was \$3.50; the maximum was \$22.50; and the average pay was \$14.69.

Measures

After all missions, the computer showed subjects their performance scores. These scores were recorded to provide measures of subjects' levels of task performance.

The primary behavioral measure this research employed was the number of sessions beyond the initial three which subjects signed up for and attended. At the end of subjects' third session, experimenters told them that, although the research project itself was completed, the computer terminals were going to be sitting idle during the following week. They learned that if they wished, they could sign up for between one and three additional sessions. Those wishing to do so chose times that were convenient for them from the available time slots. All subjects were also informed that the experimenters would still ask them to fill out short questionnaires after these extra sessions. The purpose of this, they were told, was to keep records of each person's reactions to the game, in case this information was needed at some future time. Subjects in the two payment conditions were emphatically told that since the research project itself was completed, it was absolutely certain that they would not receive payment for any subsequent sessions.

After all sessions subjects filled out brief questionnaires. The first section of the questionnaire contained a 6-item scale designed to assess their attributions of the causes of their performance on the game in that session. Subjects were asked to indicate the extent to which they felt that each of the six factors had influenced their performance on a scale from 1, not at all, to 7, to a great extent. The Appendix lists the six factors contained in the scale.

The next section of the questionnaire contained single items that assessed on 7-point scales: (1) how competent subjects felt as starship captains at the conclusion of each session on a scale ranging from totally incompetent to totally competent; and (2) how much subjects enjoyed playing *Star Trek* on a scale from not at all to very much.

The final section of the questionnaire contained seven adjective pairs, separated by 7-point scales, designed to assess subjects' overall affective reactions to the task. The Appendix lists these seven adjective pairs in the order and positions in which they were presented.

In addition, after the second session subjects took Rotter's (1966) scale that measures internal-external locus of control; the complete 29-item forced-choice format was used.

RESULTS

The results for each subject were averaged over the total number of sessions attended by that individual; numbers of sessions varied between the minimum required number of three and the maximum permitted number of six.

Two a priori hypotheses had been made about the scales used. It was posited that four items (2, 3, 5, 6) of the attribution scale tapped an external attribution factor and that two items (1, 4) tapped an internal attribution factor. The seven affective response items, of which items 3, 4, and 6 were reverse scored, were expected to tap a single affective response factor. Factor analyses of these scales confirmed these hypotheses. As a result, responses to items 2, 3, 5, and 6 of the attribution scale were averaged to provide an external attribution score ($\alpha = .75$), and responses to items 1 and 4 were averaged to provide an internal attribution score ($\alpha = .72$). Responses to the seven affective response items were also averaged to provide an overall affective response score ($\alpha = .77$).

Table 1 summarizes the numbers of sessions attended by subjects in each of the three reward conditions.

Table 2 compares means on each of the variables for each of the three reward conditions, as well as comparing the no-reward condition to the two reward conditions grouped together. The results do not support the undermining hypothesis: there were no significant differences among the reward conditions on any of the behavioral or self-reported variables.

Table 3 reports correlations among task performance, the behavioral and the self-reported measures of intrinsic motivation, and the hypothesized intervening variables, perceived competence and attributed causes of

TABLE 1
Numbers of Sessions Attended by Subjects in Each Reward Condition^a

Number of Sessions Attended	Reward Conditions			Total
	No Reward	Noncontingent Reward	Contingent Reward	
3	4	6	3	13
4	5	2	5	12
5	1	0	2	3
6	6	5	3	14
Totals	16	13	13	42

^aEntries in the table are numbers of subjects.

TABLE 2
Effects of Extrinsic Reward Condition upon Each of the Intervening and Dependent Variables

Variables	Reward Condition			Reward vs. No Reward			Whole Sample
	No Reward (n = 16)	Noncontingent Reward (n = 13)	Contingent Reward (n = 13)	F _{2,39}	No Reward (n = 16)	Reward (n = 26)	
Total sessions attended	4.56	4.31	4.38	0.15	4.56	4.35	4.43
Performance score	3.58	3.66	3.26	0.32	3.58	3.46	3.50
Enjoyment	6.00	5.96	5.94	0.01	6.00	5.95	5.97
Affective response	5.89	5.79	5.91	0.07	5.89	5.85	5.86
Perceived competence	4.98	4.44	4.58	1.79	4.98	4.51	4.69
Internal attribution							
of performance	4.76	4.68	4.73	0.02	4.76	4.70	4.73
External attribution							
of performance	3.68	3.68	3.67	0.00	3.68	3.68	3.68

TABLE 3
Correlations among Behavioral and Self-Reported
Measures of Intrinsic Motivation and Interest

Variables	1	2	3	4	5	6	7
1. Total sessions							
2. Performance	.50***						
3. Enjoyment	.19	.23					
4. Affective response	.18	.06	.87***				
5. Perceived competence	.31*	.37**	.30*	.27*			
6. Internal attribution of performance	.02	.16	.18	.08	.35**		
7. External attribution of performance	-.44**	-.41**	-.29*	-.24	-.10	.24	
8. Locus of control	.09	-.06	-.19	-.19	-.15	.10	.40**

* $p < .05$ ** $p < .01$ *** $p < .001$

performance. Results supported Hypothesis 1, that level of performance significantly influences perceptions of competence and attributions of causes of performance. The average performance score was significantly positively related to perceived competence ($r = .37$, $p < .01$) and negatively related to external attributions of performance ($r = -.41$, $p < .01$). However, the predicted positive relationship between performance and internal attributions of performance ($r = .16$) was not significant. Hypothesis 2 concerned the relationship between scores on the Rotter internal-external locus of control scale and attributions of causes of performance. The significant positive correlation between score on the Rotter scale and external attribution of performance ($r = .40$, $p < .01$) provided partial support for this hypothesis, although the correlation between internal-external locus of control and internal attributions was not significant and not in the predicted direction ($r = .10$). The pattern of results relevant to Hypothesis 3, which concerned the relationship between perceived competence, attributions, and intrinsic motivation, indicated that subjects who perceived themselves as relatively competent on the task tended to return for more additional sessions ($r = .31$, $p < .05$), while individuals who attributed their performance to external factors tended to return for fewer additional sessions ($r = -.44$, $p < .01$). However, internal attribution of causes of performance was not related to the frequency of returning to engage in the task.

Regression analysis was used to further investigate the relationships between the intervening variables, perceived competence and attributed causes of performance, and the behavioral and self-reported measures of intrinsic motivation. There was no basis for hypothesizing that any intervening variable had causal priority in influencing intrinsic motivation; thus,

each measure of intrinsic motivation was regressed on the three variables—perceived competence, internal attribution, and external attribution—simultaneously. In addition, the score on the Rotter internal-external locus of control scale was added to the regression equation in a second step. The Rotter scores showed high correlation with the external attribution of performance scores ($r = .40, p < .01$) and low correlations with each of the measures of intrinsic motivation ($r = .09$ with total sessions attended, $r = -.19$ with enjoyment, $r = -.19$ with average affective response, all n. s.), indicating that this score might be operating as a suppressor variable. It was thought that including this score might control for extraneous variance in external attributions not related to intrinsic motivation and thus increase explained variance for the latter.

Table 4 shows results of the regression analyses. The set of three independent variables was significantly related to the behavioral measure of intrinsic motivation ($R = .52, F_{3,38} = 4.66, p < .01$), although within this regression equation only the regression coefficient for the external attribution variable was significantly different from zero ($t = 2.92, p < .01$). The addition of the internal-external locus of control score to the equation resulted in a significant increment in R to .61 (for the R^2 increment, $F_{1,37} = 5.99, p < .05$) confirming that this score acted as a suppressor here. In itself, the multiple R (.61) for the final equation was highly significant ($F_{4,37} = 5.61, p < .01$), as were the regression coefficients associated with perceived competence ($t = 2.11, p < .05$), external attribution of performance ($t = 3.84, p < .01$), and locus of control ($t = 2.54, p < .05$).

For the self-reported measures of intrinsic motivation, only the simultaneous regression of enjoyment on the set of three variables was significant ($R = .43, F_{3,38} = 2.90, p < .05$), and within this equation only the regression coefficient associated with external attribution of causes of performance was significant ($t = 2.03, p < .05$). The set of three variables was not significantly related to the average affective response score. Locus of control did not operate as a suppressor for either self-reported measure of intrinsic motivation.

DISCUSSION

The research reported here employed: (1) a task that was highly intrinsically motivating; (2) a quantitative measure of task performance; (3) direct measures of two intervening cognitive variables, perceived competence and attributed causes of task performance; and (4) a variety of behavioral and self-reported measures of intrinsic motivation. Results were derived from three to six hours of experimental participation per subject over periods of one to two weeks. The results do not support the hypothesis that extrinsic rewards undermine intrinsic interest in tasks. This study found no significant differences in results for those who received no pay, those who received fixed pay, and those whose pay was contingent on performance. These results are consistent with the findings of Phillips and Lord (1980), who similarly

TABLE 4
Results of Regression Analyses of the Effects of Perceived Competence, Attributions of Performance, and Locus of Control on Measures of Intrinsic Motivation

Independent Variables	Dependent Variables ^a					
	Total Sessions		Enjoyment		Affective Response	
Perceived competence	.25	.30*	.21	.20	.22	.21
Internal attribution	.04	.02	.18	.18	.06	.06
External attribution	-.43**	-.56**	-.31*	-.29	-.23	-.20
Locus of control	—	.36*	—	-.06	—	-.08
R ²	.52	.61	.43	.43	.35	.36
F	4.66**	5.61**	2.90*	2.16	1.74	1.34

^aStandardized coefficients reported. The left-hand column under each heading reports results for the 3-variable equation; the right-hand column reports results for the 4-variable equation. The respective F-values are based on 3,38 and 4,37 degrees of freedom.

* $p < .05$

** $p < .01$

found that pay had no effect upon intrinsic motivation, even though they recruited subjects with explicit promises of financial reward. These two studies employed different recruiting strategies and hence had subjects with differing expectations. The consistency of results across these two studies indicates potentially wide generality of the findings reported here.

The predicted relationships observed between performance and the intervening cognitive variables, competence and attributions, and the relationships between these intervening variables and the measures of intrinsic motivation, were all consistent with most conceptual discussions of the nature and determinants of intrinsic motivation (de Charms, 1968; Deci, 1975; Staw, 1976; Salancik, 1975). Two other relationships, the significant positive one between performance and perceived competence, and the negative one between performance and external attribution, are of interest in that few previous empirical studies have investigated them. This lack may have been in part because most studies in this area have not employed tasks that lent themselves to quantitative measurement of performance. The nonsignificant low correlation between performance and internal attribution indicates that the extent to which individuals attribute performance to internal factors is relatively independent of level of performance. At the same time, the strong negative correlation between performance and external attribution does indicate that poor performers tend to attribute their lack of success to factors outside themselves. In addition, the positive correlation between score on the locus of control scale and external attributions, combined with that score's significant suppressor effect on the relationship between external attributions and intrinsic motivation, suggest that future researchers in

this area might find it valuable to include measures of locus of control in their investigations.

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APPENDIX

Items employed in assessing attributions of causes of performance were:

1. Your own skill as a starship captain
2. Luck
3. Lack of knowledge of the game
4. The strategy you adopted as captain
5. Lack of experience with the game
6. Unpredictable chance factors

Adjective pairs employed to assess overall affective reaction were:

1. Unpleasant, pleasant
2. Dull, exciting
3. Significant, pointless
4. Challenging, trivial
5. Boring, interesting
6. Satisfying, unsatisfying
7. Tedious, fun

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AN INVESTIGATION OF POSITIVE-FINDINGS BIAS IN EVALUATION OF ORGANIZATION DEVELOPMENT INTERVENTIONS

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This study investigated the possibility of an inverse relationship between methodological rigor and positive results from organization development (OD) interventions in OD evaluations published between 1978 and 1983. The present study attempted to improve upon earlier investigations of the same issue by using (1) the most recent published work, (2) an expanded scope of studies considered, (3) an improved scale for assessing methodological rigor, and (4) a panel of judges to assess the rigor and outcomes of the published studies. Results of the overall analysis indicated no support for the notion of a positive-findings bias in organization development research. However, when we examined only process interventions there was some evidence of a positive-findings bias in published work.

Terpstra (1981) posited the existence of a bias in evaluations of organization development (OD) interventions. Specifically, he hypothesized an inverse relationship between degree of methodological rigor and reported success of OD interventions, suggesting that the less rigorously an intervention was evaluated, the more likely it was to report positive outcomes. His evaluation of 52 published OD studies appeared to support his hypothesis of a positive-findings bias. Bullock and Svyantek (1983) attempted to replicate these results using the same sample of articles, but reported considerable difficulty in (1) identifying the sample, and (2) assessing both the methodological rigor and outcomes of the included studies. Through their eventual analysis of 90 OD evaluations, they reached a conclusion opposite to Terpstra's—they found no evidence, in the articles examined, supporting the existence of a positive-findings bias.

Since evidence existed on both sides of this issue, further investigation of the positive-findings bias hypothesis seemed warranted. We attempted to extend and expand the previous investigations in the following ways: (1) we analyzed the most recently published evaluations of OD interventions. The

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previous studies examined articles from 1965 through 1980; the time frame for our analysis was 1978 through 1983. (2) We expanded the scope of studies considered. The previous analyses only dealt with evaluations of process interventions published in one journal; our analysis expanded this scope both in terms of published sources and types of OD interventions included. (3) We used an improved scale for assessing the methodological rigor of the published research. Previous studies used a methodological rigor score based upon an evaluation of six dimensions of the research design and procedure; we used a similar but modified assessment scale that evaluated the research on nine dimensions. (4) Finally, we used a panel of judges to assess methodological rigor and outcomes of the evaluation studies. Both previous studies used a dyad to make these assessments; we employed a panel of four, and later two additional judges, to check independence of assessments.

THE RESEARCH ISSUE

The possibility of a positive-findings bias in published evaluations of OD interventions is a critical concern for the field of organization development. Numerous authors have pointed to a lack of rigor in OD evaluation research and stressed the need for improvements (e. g., Porras & Berg, 1978a; Terpstra, 1982; White & Mitchell, 1976; Woodman & Sherwood, 1980). The assessment of organizational change is a challenging task, fraught with methodological dilemmas, measurement problems, and practical constraints (e. g., Seashore, Lawler, Mirvis, & Cammann, 1983; Wortman, 1983). Yet, without rigorous evaluation of change programs, it is difficult to see how progress in applying behavioral science knowledge to more effective design and management of organizational change can be made. Similarly, OD cannot contribute meaningfully to the body of knowledge in the organizational sciences unless effects of OD interventions are systematically examined. Thus, both science and practice lead to the same need for evaluation. Systematic bias in OD evaluation, as it would in any other applied field, threatens the validity of inferences drawn. The research issue raised by Terpstra (1981) and further explored by Bullock and Svyantek (1983) is not a trivial one.

THE PREVIOUS STUDIES

Terpstra's (1981) sample of articles was intended to include all empirical evaluations of four major varieties of OD interventions—laboratory training, process consultation, survey feedback, and team building—published between 1965 and 1980 in the *Journal of Applied Behavioral Science*. Two judges awarded each of 52 studies a methodology/design score designed to indicate a study's relative degree of methodological rigor. This score included ratings on six dimensions: (1) sampling strategy, (2) sample size, (3) use of a control group, (4) use of random assignment, (5) measurement strategy, and (6) significance level for statistical testing. Judges assigned each dimension a value of zero or one. For example, a one indicated that a study used control groups, a

zero indicated the absence of controls. Then the six dimensions were summed to yield a methodology/design score for an evaluation. In addition, Terpstra classified each of the 52 articles by the degree of success reported for the OD intervention. Specifically, he categorized studies as reporting (1) uniformly positive results, (2) mixed or nonsignificant results, or (3) uniformly negative results. With intervention outcome category as the independent factor and methodology/design score as the dependent variable, a one-way analysis of variance indicated significant differences across mean methodology/design scores in the three outcome categories. Subsequent multiple-range testing showed that studies reporting uniformly negative outcomes were more rigorously evaluated than studies in the other two categories. Terpstra concluded that his analysis supported the hypothesis of an inverse relationship between the degree of methodological rigor of an evaluation and the reported success of an OD intervention.

Bullock and Svyantek (1983), during an attempted replication of Terpstra's (1981) analysis, identified 90 published OD evaluations that seemed to fit the criteria for inclusion.¹ With the same scale Terpstra had used for assessing methodological rigor and the same categories of intervention outcomes, subsequent analysis of variance revealed no statistically significant differences among mean methodology/design scores in the three intervention outcome categories. Besides arriving at the opposite conclusion concerning a positive-findings bias, Bullock and Svyantek suggested a number of additional concerns. Most particularly, they identified problems with assessing both methodological rigor and outcomes of OD evaluations. Although Terpstra had reported 100 percent agreement between the dyad judging methodology/design scores and outcomes, Bullock and Svyantek reported initial agreement between raters ranging from approximately 72 to 89 percent on various dimensions of the methodology/design scale.² The difficulties experienced by these researchers and their criticisms of this methodology/design scale prompted our attempts to improve the assessment of methodological rigor rather than to simply use the same scale. This issue also underlay our decision to employ a panel of four judges to make the assessments needed for our analysis.

METHODS

Sample

A review of the 1978-83 literature yielded 50 original empirical evaluations of organization development interventions.³ Although we surveyed many sources, 42 of the 50 articles were from two journals: the *Journal of*

¹Studies that fit were empirical evaluations of laboratory training, process consultation, survey feedback, and team building interventions that had appeared in the *Journal of Applied Behavioral Science* between 1965 and 1980.

²See Bullock and Svyantek (1983) for a detailed discussion of these validity problems.

³We eliminated some articles published during this period that were additional evaluations, from different perspectives, of interventions already represented in the sample.

Applied Behavioral Science and Group & Organization Studies. The decision rule for the time frame used was simple: we started with the most recent year and worked backward until we had accumulated a sufficient number of articles for statistical testing. The types of OD interventions in our analysis included team building, survey feedback, laboratory training, process consultation, various forms of structural interventions, flexitime, managerial grid, various action research paradigms, management by objectives (MBO), job redesign, participative decision making, QWL programs, and intergroup development. The Appendix lists all 50 articles included in this analysis.

Assessment of Methodological Rigor

Building on the work of Terpstra (1981) and of Bullock and Svyantek (1983), we assessed each of the 50 studies on nine dimensions of methodology and research design. The methodology/design score used in our analysis was the sum of scores for the nine dimensions. Studies received values of zero or one on each dimension as follows: (1) For sampling strategy, 1 indicated a full census or a representative sampling strategy like random sampling, stratified sampling, or cluster sampling. A nonrepresentative sampling strategy or an unspecified sampling plan was marked 0. (2) For sample size, 1 was assigned when $N > 30$, 0 when $N \leq 30$. (3) For control or comparison group, 1 indicated the presence of such a group, and 0 indicated the absence of any control or comparison group. (4) For random assignment utilization, 1 represented use of random assignment, and 0 was absence of random assignment. (5) For measurement strategy, 1 indicated longitudinal measurement, or measures taken at two or more times, and 0 indicated cross-sectional or a one-time measurement. (6) For reliability and validity of measures employed, 1 represented reliability of measures $\geq .60$ with some validity evidence; 0 stood for no reliabilities reported or reliabilities $< .60$ with no validity evidence. (7) For criteria for dependent variable(s), 1 equaled presence of some objective criteria; 0 stood for perceptual data only. (8) For significance level, 1 indicated a probability of type 1 error $\leq .05$; 0 indicated $p > .05$. (9) Finally, for use of a multivariate analysis procedure, 1 was yes, and 0 was no.

Our adding dimensions 6, 7, and 9 were the major changes from the six-dimension scale created by Terpstra (1981). Dimension 6 represented an attempt to assess the psychometric properties of the measures employed. Dimension 7 was prompted by a concern that many OD studies have relied too heavily on self-reported perceptual measures. Several authors have identified this weakness in OD evaluations and suggested that greater efforts are needed to develop more objective indicators for variables of interest (e. g., DeMeuse & Liebowitz, 1981; Porras & Berg, 1978a; Woodman & Sherwood, 1980). Dimension 9 arose from a concern that researchers have frequently failed to employ multivariate analysis procedures when the existence of multiple dependent variables has called for such procedures.

In addition to adding three dimensions, we modified two others in light of criticisms that Bullock and Svyantek (1983) had raised. We broadened

dimension 3 to include comparison groups, such as Campbell and Stanley's (1966) nonequivalent control groups as well as true control groups. We altered dimension 5 to a focus on longitudinal measurement strategies rather than on pretest/post-test measurement strategies. The purpose of every modification was to create a more valid measurement scale, one that would capture more of the methodological domain considered important for rigorous research.

After some initial discussion, four judges independently assessed each of the 50 studies for degree of methodological rigor.⁴ Table 1 shows the results of this initial rating. Despite attempts to make explicit the decision rules concerning each dimension and the seeming straightforwardness of some categories, a certain degree of subjectivity remained in the judgments. Our experience in making these judgments was very similar to Bullock and Svyantek's (1983) and very unlike that reported by Terpstra (1981). To give some common examples of sources of disagreements: judging a study's sampling strategy often hinged on how a judge defined the study's population; different statistical tests in the same study may have had different sample sizes; tests may have been run at different significance levels; some measures used may have had reasonably good psychometric properties while others did not, and so forth. Variations in these kinds of judgments led to the level of disagreement evinced in Table 1. However, it is important to note that the methodology/design scores used in this analysis represent the consensus of the four-person panel, because after making their independent ratings, the panel members met to assign final scores for the studies. It took approximately eight hours of discussion to reach agreement on all scores.

Table 2 indicates the final score (0 to 1) awarded to each of the 50 studies included in the analysis on each of the nine dimensions composing

TABLE 1
Initial Agreement among Four Judges
Assessing Methodological Rigor and Outcomes

Methodology/Design Dimensions	Percent Agreement
1. Sampling strategy	80%
2. Sample size	85%
3. Control or comparison group utilization	93%
4. Random assignment utilization	95.5%
5. Measurement strategy	92.5%
6. Reliability/validity of measures	84%
7. Criteria for dependent variable(s)	91.5%
8. Significance level	94%
9. Multivariate analysis procedure	98%
Outcome of OD intervention	82%

⁴The four judges included the two authors and two doctoral students selected for their knowledge of research methodology. Later in the study we used two additional judges—they too were doctoral students.

TABLE 2
Scores Awarded to Studies Used in the Analysis and Characteristics of Studies

Study ^a	Primary Intervention(s)	Organizational Participants and Setting	Methodological Rigor Assessment ^b									Major Findings ^c
			1	2	3	4	5	6	7	8	9	
Adams & Sherwood (1979)	Survey feedback	Soldiers, four engineering companies, U. S. army	0	0	1	1	1	1	1	1	0	Work-project efficiency (+) Satisfaction (M) Intergroup relations (NC) Supervisory consideration (M)
Bartunek (1980)	Participation training	Teachers, nine elementary schools	0	1	1	0	0	0	0	1	0	Value of participation (NC) Interaction indicated between degree of agreement and training
Bartunek & Keys (1982)	Organizational training Consultation training Participative goal-setting	Teachers & principals, 14 elementary schools	1	1	1	0	1	0	0	1	0	Power equalization (+) Relationship between power equalization and participation (+) Relationship between power equalization and satisfaction (weak +)
Bonjean, Brown, Grandjean, & Macken (1982)	Decentralization, participative decision making	Faculty, School of Nursing, University of Texas	1	1	0	0	1	1	0	1	0	Satisfaction (+)
Boss (1978)	Team building	Top level administrative staff, seven criminal justice-related agencies	0	0	1	0	1	0	0	0	0	Team effectiveness (+) (leader present) (NC) (leader absent)

TABLE 2 (continued)

Study ^a	Primary Intervention(s)	Organizational Participants and Setting	Methodological Rigor Assessment ^b									Major Findings ^c
			1	2	3	4	5	6	7	8	9	
Boss (1979)	Team building, process consultation, survey feedback, and others	(initially) Sheriff & top staff, county sheriff department	1	1	1	0	1	0	1	1	0	Organizational climate (+) Leader effectiveness (+) Turnover (-)
Boss (1983)	Team building, personal management interview (PMI)	CEOs & top staff, 23 separate organizations	0	0	1	0	1	0	0	1	0	Team effectiveness (+)
Boss & McConkie (1981)	Team building	Associate director & frontline supervisors, public agency	0	0	1	0	1	0	0	1	0	Organizational climate (-) Team effectiveness (+)
Cohen & Gadon (1978)	Action research, survey feedback	Board members & administrators, public school system	0	1	0	0	1	0	0	0	0	Organizational climate (+)
Conlon & Short (1983)	Survey feedback	472 work groups, U. S. Air Force	0	1	1	0	1	1	0	1	0	Organizational climate (+) Work attitudes (+)
Cooke & Coughlan (1979)	Survey feedback, problem-solving, collective-decision structures	Administration & teachers, seven elementary schools	0	0	1	1	1	0	0	1	0	Organizational climate (+) Work attitudes (+)

TABLE 2 (continued)

Study ^a	Primary Intervention(s)	Organizational Participants and Setting	Methodological Rigor Assessment ^b									Major Findings ^c
			1	2	3	4	5	6	7	8	9	
Crawford, Thomas, & Fink (1980)	Training (supervisory, mentoring), "growth" workshops	Low-performing sailors, U. S. Navy Ships	0	1	1	0	1	1	1	1	0	Performance (+) Disciplinary problems (-)
Davis (1979)	Survey feedback	Division staff, state welfare agency	1	0	0	0	1	0	0	1	0	Communication (+) Perceived effectiveness (+)
Gavin & Krois (1983)	Survey feedback	Work groups, large underground mining company	1	1	1	0	0	1	0	1	0	Work attitudes (+) Meeting effectiveness (+)
Gavin & McPhail (1978)	Team building, survey feedback	Employees, non-academic service department of university	1	1	1	0	1	1	0	0	0	Organizational climate (NC) Power perceptions (+) Stress (-)
Greenbaum, Holden & Spataro (1983)	Structural change (communication process)	Work groups, industrial organization	0	1	0	0	0	1	1	1	1	Group problem solving & communication effectiveness (+)
Greenhalgh (1982)	Action research, survey feedback	Employees of a merged (from two previously independent) mental health hospital	1	1	1	0	0	1	0	0	0	Job security (NC) Perceived productivity (+) Turnover propensity (-)

TABLE 2 (continued)

Study ^a	Primary Intervention(s)	Organizational Participants and Setting	Methodological Rigor Assessment ^b									Major Findings ^c	
			1	2	3	4	5	6	7	8	9		
Harris (1978)	Action research, survey feedback	Patients and staff, eight ambulatory care clinics (U. S. Navy hospitals)	1	1	1	1	0	1	0	0	0	0	Perceived improvement in staff attitudes/behavior Patients' satisfaction (+)
Hess (1978)	Survey feedback	Salaried employees, division of a large automobile manufacturer	1	1	1	1	0	1	1	1	1	0	Satisfaction (+) Absenteeism (-)
Hicks & Klimoski (1981)	Flexitime	Two organizations: (1) manufacturer of computer information systems, (2) insurance company	0	1	1	1	0	0	1	0	1	1	Work & QWL, leisure satisfaction (NC) Perceived control (+) Satisfaction with travel, parking, & logistics (+) Perceived interrole conflict (-)
Hughes, Rosenback, & Clover (1983)	Team building	Cadet squadron, U. S. Air Force Academy	0	1	1	1	1	1	0	1	1	0	Organizational climate (+) Performance (+)
Kaplan (1979)	Process consultation	Undergraduate students, Yale University (laboratory experiment)	0	1	1	1	1	1	1	1	1	0	Performance (NC) Satisfaction (+) Stress (+) Social knowledge (NC)
Keith (1978)	Temporary systems	Teachers, 24 schools	0	1	1	1	0	0	0	1	1	0	Role strain (+) Turnover (+) Productivity (-)

TABLE 2 (continued)

Study ^a	Primary Intervention(s)	Organizational Participants and Setting	Methodological Rigor Assessment ^b									Major Findings ^c
			1	2	3	4	5	6	7	8	9	
Keller (1978)	Managerial grid	Hourly & salaried employees, large refinery & chemical plant	0	1	1	0	1	1	0	1	0	Organizational climate (NC) or (-) Satisfaction (-) Power relationships (NC) Leadership style (NC)
Keys & Kreisman (1978)	Team building	Teachers, principals and students, six middle schools	1	1	1	0	0	0	1	0	1	Organizational climate (+) Interpersonal behavior (NC)
Kim & Campagna (1981)	Flexitime	Employees of four divisions, county welfare agency	0	1	1	1	1	1	1	1	0	Absenteeism (-) Performance (+)
Kindler (1979)	Meditation-relaxation technique	Management graduate students, UCLA (laboratory experiment)	0	1	1	1	1	0	1	1	0	Group problem solving effectiveness (+)
Lipshitz & Sherwood (1978)	Process consultation	Psychology students, Purdue University (laboratory experiment)	0	1	1	1	1	0	1	1	1	Group performance (NC) Group cohesiveness (+)
Lundgren & Knight (1978)	Sensitivity training	20 T-groups, NTL Institute	0	0	0	0	1	1	1	1	1	T-groups show systematic, positive changes over time
Morrison & Sturges (1980)	Action research, survey feedback, team building, and others	Top management group, large state government organization	1	0	0	0	1	1	0	1	0	Leadership effectiveness (NC) Role clarity (+) Communication (+) Collaboration (+)

TABLE 2 (continued)

Study ^a	Primary Intervention(s)	Organizational Participants and Setting	Methodological Rigor Assessment ^b									Major Findings ^c
			1	2	3	4	5	6	7	8	9	
Nadler, Cammann, & Mirvis (1980)	Survey feedback Structural change (information system)	Employees, supervisors, and managers; 20 retail branches of medium-sized bank	0	0	1	0	1	1	1	1	0	Perceived control, climate, satisfaction, unit effectiveness, etc. (M)
Pasmore & Friedlander (1982)	Action research	Employees, plant producing consumer electronic products	1	1	0	0	1	0	1	1	0	Employee injuries (-)
Pasmore & King (1978)	Socio-technical systems, job redesign, survey feedback	Hourly employees, production facility of large national food processing corporation	1	1	1	0	1	1	1	1	1	Productivity (+) (sociotechnical intervention) Employee attitudes (+) (all interventions)
Paul & Gross (1981)	Team building, process consultation	All employees, communication & electrical division city of San Diego	1	0	1	0	1	1	1	1	0	Productivity (+) Efficiency (+) Satisfaction (+) Customer satisfaction (NC)
Peterson, Peterson, & Macy (1982)	Quality of work life Flexitime	Managers, engineers, technical staff, & clerical staff, planning & engineering branch of large southern utility	0	1	0	0	1	1	0	1	0	Experienced influence (+) Job autonomy (+) Supervisor participativeness (+)

TABLE 2 (continued)

Study ^a	Primary Intervention(s)	Organizational Participants and Setting	Methodological Rigor Assessment ^b									Major Findings ^c
			1	2	3	4	5	6	7	8	9	
Porras, Hargis, Patterson, Maxfield, Roberts, & Bies (1982)	Supervisory skills training (Modeling)	First-level supervisors & employees, three plants of large wood-products corporation	1	0	1	0	1	1	1	0	0	Supervisory behavior (+) Employee attitudes (NC) Organizational climate (+) Absenteeism & turnover (-) Performance (+)
Porras & Wilkins (1980)	Team building, socio-technical systems	Managers & staff, autonomous units of a national food service company	0	1	1	1	1	1	1	1	1	Organizational processes (-) Organizational outcomes (+)
Randolph & Edwards (1978)	Survey feedback	Staff members, college student service organization	1	1	1	0	1	1	0	1	1	Communication (+) Supervisory relations (NC) Use of MBO (NC)
Randolph & Posner (1982)	Intergroup development	Middle managers, participants in a management development program	0	0	1	1	1	1	1	1	0	Impact of intervention varies with life cycle state of organization
Scarpello (1983)	Sensitivity training, survey feedback, team building, leadership skills training, and others	Managers & researchers, R & D unit of multinational corporation	1	1	0	0	1	0	1	1	0	Complex: OD intervention effective at system level not necessarily at group/individual level

TABLE 2 (continued)

Study ^a	Primary Intervention(s)	Organizational Participants and Setting	Methodological Rigor Assessment ^b									Major Findings ^c
			1	2	3	4	5	6	7	8	9	
Scott & Moore (1981)	Management by objectives	Managers, supervisors, & professionals, transportation department, city government	1	1	1	0	0	1	0	1	0	Blacks assessed MBO program more positively than whites
Seeborg (1978)	Participative job redesign	Business people & students, simulated organization (laboratory experiment)	0	0	1	0	1	1	1	0	0	Job satisfaction (+) Perception of job characteristics (+)
Smith (1980)	Sensitivity training	31 English T-groups, Group Relations Training Association	0	1	1	0	0	0	0	1	0	Outcomes of T-group experience related to trainer behavior
Sorenson & Head (1983)	Quality of work life, survey feedback	Employee, community service non-profit organization	0	0	0	0	1	0	1	0	0	Employee participation (+) Program income (+)
Stebbins & Snow (1982)	Action research, survey feedback	All managers & exempt employees, Southern California region, Kaiser-Permanente	1	0	0	0	0	0	1	0	0	Complex: 8 units—dramatic "improvements"; 12 units—some improvements; 2 units unaffected
Stephenson, Michaelson, & Franklin (1982)	Nominal group technique	Participants: workshop to develop solar energy plan for state of Oklahoma	1	1	0	0	0	1	0	1	0	Group problem-solving effectiveness (+)

TABLE 2 (continued)

Study ^a	Primary Intervention(s)	Organizational Participants and Setting	Methodological Rigor Assessment ^b									Major Findings ^c
			1	2	3	4	5	6	7	8	9	
Stoelwinder & Clayton (1978)	Management by objectives, structural change, and team building	Managers & staff, Sir Charles Gairdner Hospital, Australia	0	0	0	0	1	0	1	0	0	Financial performance (+) Problem-solving effectiveness (+) Employee attitudes (+)
Tandon & Brown (1981)	Skill training, group development	Poor farmers, 25 villages, Western India	0	0	1	0	1	0	1	1	0	Ability to take group action Ability to organize & influence (+)
Terpstra, Olson, & Lockeman (1982)	Management by objectives	Business faculty, University of Idaho	0	0	0	0	1	0	1	0	0	Performance (+) Satisfaction (-)
Woodman & Sherwood (1980)	Team building	Civil engineering student surveying parties, Purdue University	0	1	1	1	0	1	1	1	1	Performance (NC) Perceived effectiveness & participation (+) Satisfaction (NC)

^aSee Appendix for full citation.
^bSee text for a description of these nine dimensions.
^cWith + = increase, - = decrease, NC = no change, and M = mixed results.

the methodology/design scale. In addition, Table 2 lists the primary OD interventions each study used, the settings and participants for interventions, and the major findings reported by each study's authors.

Assessment of OD Intervention Outcomes

In a manner similar to that of the previously reported studies, this study classified the 50 articles into three groups on the basis of the reported success of their interventions. These classes were (1) uniformly positive results, (2) mixed or nonsignificant results, and (3) uniformly negative results. The key in making this judgment was to focus on intended targets of change or improvement, generally captured in a study's stated hypotheses. Table 1 indicates the initial level of agreement among the judges. Again, the final outcome category used in the analysis reported below represents the consensus of the four-person panel.

As a check upon the panel's independence of judgment, two more individuals independently assessed each of the 50 studies with regard to intervention outcome. These two judges were unaware of the methodological rigor scores that had been awarded to articles and blind to the hypothesis of the study. Our concern here was that the original panel might have allowed their knowledge of the levels of methodological rigor of the studies to influence, even unconsciously, their categorizations of outcomes of the interventions. The final decisions regarding the outcomes of the OD interventions made by the two additional judges agreed 72 percent with the consensual judgments of the four-person panel. This level of agreement was similar to the 82 percent agreement among the panel's original judgments, and also similar to the 75 percent agreement Bullock and Svyantek's dyad reached on their first series of outcome judgments. Experience thus suggests that, given the subjective nature of the categories used, an initial level of agreement with regard to outcomes of interventions is not likely to be above 70-80 percent.

This research included a final check on this possible source of bias, potential interdependence of methodology/design scores and outcome judgments. We subsequently analyzed data using the outcome categories supplied by the two additional judges in place of those based on the consensus of the original four-person panel. The Results section gives statistical results of these bias checks. In terms of the general examination of the positive-findings bias hypothesis, it appears that any possible bias stemming from knowledge of the methodological rigor of the research did not affect results of the analyses.

RESULTS

Table 3 summarizes (1) the scores for methodological rigor and (2) the assignments as to outcomes of OD interventions that the 50 evaluation studies received. Articles got methodology/design scores ranging from 2 through 8, with 5 representing the modal assessment. No articles received values of 1

or 9. In terms of the assigned outcomes of the OD interventions, our sample was similar to Terpstra's (1981) in that few published studies reported negative results. Only 6 percent of the articles fell in this outcome category; 48 percent reported mixed or nonsignificant results, and 46 percent reported uniformly positive outcomes.

A 1×3 ANOVA was performed on mean methodology/design scores across the outcome categories; Table 4 reports these. The differences in means were consistent with the positive-findings bias hypothesis, in that studies reporting uniformly positive results were, on the average, the least rigorously done. However, these differences were not large enough to be statistically significant ($F_{2,47} = 0.704, p = .499$).

Next, the data were analyzed again with the outcome categories chosen by the two additional judges substituted for the judgments of the four-person panel. The results of the 1×3 ANOVA did not change—there were no statistically significant differences among mean methodology/design scores across outcome categories ($F_{2,47} = 0.371, p = .692$).

TABLE 3
Classification of OD Evaluation by Degree
of Methodological Rigor and Success of Outcomes

Methodology/Design Score	Outcome of OD Intervention			Totals
	Uniformly Positive	Mixed or Nonsignificant	Uniformly Negative	
2	3	3	—	6
3	2	2	1	5
4	6	3	—	9
5	7	7	1	15
6	4	3	—	7
7	—	6	—	6
8	1	—	1	2
Totals	23	24	3	50

TABLE 4
Results of ANOVA for Methodology/Design
Scores across Outcome Categories

Outcomes of OD Interventions	n	Methodology/Design Scores		ANOVA	
		Means ^a	s. d.	F	p
Uniformly positive	23	4.48	1.47	.704	.499
Mixed or nonsignificant	24	4.96	1.68		
Uniformly negative	3	5.33	2.52		

^aThe higher the number, the greater the degree of methodological rigor.

The analysis of variance routine used came from the Statistical Package for the Social Sciences (SPSS). Although this routine has appropriate adjustments for unequal cell sizes, and the F -statistic is robust to moderate departures from the homogeneity of variance assumption, we had some concern about the large disparity in cell sizes in the ANOVA test. Thus, we performed a separate t -test on the differences between uniformly positive and mixed-outcome categories.⁵ In each of these cells, n was large enough to provide a difference test of reasonable power. However, there was no statistically significant difference between these two means ($t_{45} = 1.04$, $p = .152$). We report this result in part as a contrast for the difference testing reported later in this section.

Again, substituting outcome categories supplied by the two independent judges yielded no statistical differences between these two means ($t_{46} = 0.59$, $p = .279$).

To achieve maximum comparability with the previous studies, we performed an additional analysis using only evaluations of process interventions—team building, process consultation, survey feedback, and laboratory training. In 27 of the 50 articles analyzed, one of these four varieties of OD intervention was the primary focus. However, only one of these 27 articles reported uniformly negative results, so this study was eliminated from further analysis. We used a one-tailed t -test to examine the differences between mean methodology/design scores in the uniformly-positive-results category ($n = 10$, $\bar{x} = 4.10$, $s. d. = 1.52$) and the mixed-results category ($n = 16$, $\bar{x} = 5.19$, $s. d. = 1.56$). The difference between these two means reached acceptable levels of statistical significance ($t_{24} = 1.75$, $p = .047$). We will examine the implications of these results in the Discussion section.

As with the two previous analyses, the difference between mean methodology/design scores using outcomes categorized by the two independent judges was not statistically significant, ($t_{24} = 1.01$, $p = .162$).

DISCUSSION

The strong suspicion, and occasionally the demonstration, that relatively less rigorous evaluation results in more positive findings has existed in many areas of research. For example, the director of the testing laboratories for the 1984 Olympics reported a curious correlation between the quality of studies investigating the efficacy of steroids in sports and results showing positive effects: "The lower the quality of the report, the better results they got" (Allman, 1983: 14). The work of Rosenthal and his colleagues on experimenter effects has become accepted as delineating major potential sources of error in drawing inferences from research results (Rosenthal 1966, 1969; Rosenthal & Rubin, 1978). The effects so catalogued include a tendency for experimenters to actually help create the results they expect. There are also interpreter effects, experimenters' tendencies to see what they want to see in their data. The potential for these sources of bias to

⁵We used a one-tailed test, since the positive-findings bias hypothesis predicts directionality.

exist would logically seem to be highest when research is less rigorously performed. In particular, OD research may be quite susceptible to interpretation biases when the same person is both OD consultant and evaluation researcher. A good test of this possibility would be to compare evaluations in which these roles were separated with evaluations in which the same individual took both roles. The idea of separating facilitator and evaluator roles is widely accepted in the literature, but unfortunately, it is seldom done in practice. For example, as well as we could determine from reading the published reports of the interventions we analyzed, with only a few exceptions the researcher and change agent appeared to be the same person.

On the other hand, Bass (1983) suggested that more rigorous evaluation efforts are not necessarily free of their own biases. He presented several plausible explanations for Terpstra's (1981) finding of bias in OD evaluations. Among the possible explanations were suggestions that the initial predispositions of evaluators may influence (1) standards used for evaluations, (2) objectives selected as goals of interventions, (3) focuses on short-term versus long-term effects, (4) selections of subjective rather than relatively more objective measuring tools, (5) sensitivity to confirmatory versus refuting evidence, and so on. The predispositions, biases, and values of evaluators differ; thus the basic reasons for bias, or its sources, are less clear-cut than Terpstra's (1981) analysis and conclusions suggested. Consistent with the work of Rosenthal (1966), Bass proposed that "investigators tend to find what they are seeking and fail to find what they don't want to find" (1983: 197).

Despite the obvious possibility that bias could exist in any evaluation research, it is important to stress that the analysis presented here provides no convincing empirical support for the existence of positive-findings bias among the 50 most recent (at the time of writing) published evaluations of OD interventions. This overall result is consistent with Bullock and Svyantek's (1983) findings; they also could detect no systematic bias in 90 examined studies. Although the evidence for an overall rejection of the positive-findings bias hypothesis is clear, results of the analyses are not unequivocal. When we examined only process interventions, it appeared that on the average, differences in methodological rigor may exist between studies reporting uniformly positive outcomes and those studies having mixed results. However, only one of the two tests of these differences was statistically significant, the *t*-test with outcome categories supplied by the original four-person panel. A closer examination of process interventions supports the notion that they may be more susceptible to measurement and interpretation error than are other types of interventions.

A decade ago, Friedlander and Brown (1974) drew a distinction between technostuctural and human processual approaches to organizational change. They suggested that human processual interventions, targeting people and group and organizational processes, naturally have human fulfillment as their major objectives or outcomes. Technostuctural interventions, targeting organizations' technologies and structures, have task accomplishment as

their major intervention outcomes. More recently, Porras and Berg (1978b) distinguished between process and outcome variables in assessing the effects of OD interventions. Process variables include attitudes, decision-making and problem-solving skills, group processes, motivation, involvement, openness, trust, and communication skills. Examples of outcome variables are performance level, effectiveness, efficiency, productivity, absenteeism, turnover, and job satisfaction. Although this dichotomy is rough, and many of these variables are naturally related, there does seem to be a tendency for different types of interventions to have their most pronounced effects in either process or outcome areas (Woodman & Muse, 1982). Process interventions—such as team development, survey feedback, process consultation, and laboratory training—are most likely to produce measurable changes in process variables. Evidence for changes in outcome variables stemming from process interventions is sparse (Hackman, 1983; Kaplan, 1979; Woodman & Sherwood, 1980).

We suggest that process interventions may appear to be, or may in fact actually be, less rigorously evaluated on the average than are technostuctural interventions focused on changing outcome variables. The tendency may be due to the intended targets of change, the measuring methodologies commonly employed, and perhaps to the predispositions of the evaluators (Bass, 1983). More particularly, process interventions may be more prone to yield positive results when evaluation is less rigorous because of the nature of the variables under examination. Our analysis appeared to support such a supposition. An analysis of all 50 evaluation studies, which included both human processual and technostuctural kinds of OD interventions, did not yield empirical support for the positive-findings bias hypothesis. But, isolating process interventions in the analysis suggested different results. Process interventions, by their very nature, may be more susceptible to various forms of experimenter effects and other sources of systematic bias. If this conclusion were true, it would not argue against the use of human processual OD interventions, but rather argue for improvements in evaluation. Organization development, like other fields, seeks protection against erroneous judgments through the rigors of scientific testing. However, improvements in evaluation need not be limited to increased reliance on traditional concepts of scientific rigor; such improvement could use objective, subjective, and phenomenological data together to assess organizational change (e. g., Seashore et al., 1983). Combining both quantitative and qualitative research methodologies may improve the convergent validity of evaluations of disparate approaches to organizational change.

Any investigation of the positive-findings bias hypothesis may be subject to biases of its own. In particular, the following may constrain generalizability of results: (1) a potential "file drawer" problem (Rosenthal, 1979); (2) issues surrounding analysis of specific OD interventions, or classes of interventions, versus analysis of OD interventions in general; and (3) changes in quality of evaluation rigor over time.

Only three of the 50 studies examined here reported negative results following their OD interventions. It is interesting to speculate as to why so few published studies appear to be failures. Certainly, there is some evidence that more than 6 percent of OD interventions have negative outcomes (e. g., Franklin, 1976; Mirvis & Berg, 1977). There are a number of possible reasons why more failed interventions do not get into print. These range from simple embarrassment—authors or organizations not wanting to publicize their failures—to the likelihood that failed interventions, like failed research in general, may often be difficult, if not impossible, to publish. The possibility that published studies represent a biased sample of studies actually attempted has long been recognized (e. g., Smart, 1964; Sterling, 1959). Research containing laundry lists of hypotheses, all of which were rejected, will probably never see the light of day. Reviewers and editors are likely to assume that such studies were poorly conceived, poorly executed, inappropriate tests of theories, and so forth; they are much less likely to accept assertions of strong inference tests pointing to flaws in underlying theories. In organization development, an analogy might be that reviewers would be more likely to assume that interventions were poorly done or that they were inappropriate remedies for organizational problems than that certain interventions are simply ineffective no matter how skillfully performed. Given the high probability of (1) rejection by journals and (2) researchers' choosing not to publish, it seems very likely that the probability of publication is reduced for OD evaluations whose hypothesized changes did not occur. To the extent that this file drawer phenomenon exists in OD, possible relationships between degree of evaluation rigor and degree of intervention success would be more difficult to discover, since the literature would underrepresent the negative end of the outcome continuum.

A stated objective of this research was to expand the types of interventions examined beyond the process-area focus of previous research. This broader analytic approach had both advantages and disadvantages—generalizability became an issue here in two ways. Demonstrating that published OD evaluations analyzed together are free of measurable bias related to methodological rigor does not, of course, mean that evaluations in a specific category of intervention would be free of the same bias. Similarly, finding evaluation bias in a specific type of intervention does not mean that all OD evaluations were suffering from the same problem. Further research is needed to determine which, if any, specific intervention technologies are most susceptible to positive-findings bias. Focusing analysis on these problem areas could allow identification of sources of evaluation bias such as those suggested by Bass (1983). However, sample sizes may constrain analyses of single types of interventions. In order to generate sufficient numbers for statistical testing, researchers will typically have to include many years of published work. This may, in turn, lead to another generalizability constraint.

There is evidence that the quality of evaluation research in the field of organization development has undergone slow, but steady, improvement (e. g., Vicars & Hartke, 1984). It is highly probable that the further back in

time an analysis of evaluations looks, the more likely it will be to find evaluation biases and weaknesses. For example, an analysis including a significant number of evaluations of sensitivity training from the 1960s might well lead to inferences that would be misleading in terms of current research.

In summary, to put the results reported here in the proper context in terms of future research, the most recent six years of published work suggested that a significant positive-findings bias does not exist in OD evaluations. However, research is needed to extend investigation of this issue to specific types of interventions in order to continue the current progress in OD evaluation methodology. Terpstra (1981) and others have suggested the need to discover the causes of evaluation bias. Bullock and Svyantek (1983) argued that Terpstra's suggestions for further work were premature since it makes little sense to spend time explaining nonexistent phenomena. Rather than worrying about why OD evaluators are biased, Bullock and Svyantek suggested that the next step had to be "confirming or disconfirming the basic hypothesis of an inverse relationship between methodological rigor and reported results" (1983: 224). That is what this study has attempted to do.

Rejection of the positive-findings bias hypothesis does not imply that any specific OD evaluation effort would necessarily be free of this or other forms of measurement error. However, our study does suggest that future research needs to isolate specific intervention methodologies as a precursor to determining causes of evaluation bias. Thus, researchers could concentrate their investigations of evaluation bias on areas in which it exists.

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RESEARCH NOTES

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STRATEGIES FOR INTRAFIRM TRANSFERS AND OUTSIDE SOURCING

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Make or buy? This simple phrase masks the complexities of firms' decisions concerning vertical integration strategies. One such decision is whether certain strategic business units (SBUs) should produce goods or services that they could either sell to other SBUs in their firms, or could buy from other SBUs. Another such decision concerns how much of their component requirements business units should purchase from in-house suppliers. Yet another is how much of their outputs they should sell to, or through, sister business units. Although transfer pricing rules based upon fair market values can help firms cope with such issues, there are no comparison markets for some goods and services (Williamson, 1971, 1975). Moreover, there may be strategic reasons for firms to encourage their business units to buy and sell in-house, even if such intrafirm transfers do not appear to make economic sense.

This paper explores the proposition that firms' policies regarding internal purchases and sales of goods and services vary in a systematic pattern that can be related to competitive conditions and corporate climate. Using the Profit Impact of Market Strategies (PIMS) data base, it partially replicates results obtained from field interviews (Harrigan, 1985a). Generally stated, the hypotheses tested herein are: (1) Firms are likely to undertake more intrafirm transfers within settings of competitive stability and low demand uncertainty than they will in other settings. (2) Firms that make many internal transfers in other settings do so either (a) because they lack the bargaining power needed to persuade outside suppliers or distributors to assume the risks they had hoped to avoid themselves, or (b) because vertical integration fits their parents' corporate strategy needs.

LITERATURE REVIEW

Vertical integration describes a variety of make-or-buy arrangements firms might use to obtain ready supplies of raw materials and services and ready markets for their outputs. It encompasses the coordination of vertical relationships between SBUs. Vertical integration is often necessary where markets cannot allocate resources in a manner that alleviates uncertainty

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(Williamson, 1971, 1975). It can also be a means of avoiding search, negotiation, and regulatory costs (Coase, 1937; Wiek, 1969), especially where firms are highly dependent upon stable supplies of resources (Pfeffer & Salancik, 1978). Vertical integration can propel firms into businesses very different from their strategic core activities, as in the example of a motion picture studio entering the pay-cable television business.

Although strategy researchers have recognized vertical integration as one of the oldest and most frequently embraced growth strategies (Chandler, 1977), they have just begun to understand its complexities. Findings concerning whether or not it is a profitable strategy have been significantly diverse (Buzzell, 1983; Hawks, 1984; Lubatkin, 1982; Rumelt, 1974), and there have been a variety of opinions concerning how to use it effectively. For example, Porter (1980) cautioned firms that undertaking backward or forward integration is a strategic decision that firms can make but once. In contrast, my previous work (Harrigan, 1983) has argued that the several dimensions that characterize vertical integration can provide firms with substantially greater opportunities to fine-tune this strategy than had been recognized previously.

MEASURES OF INTEGRATION

Part of the confusion surrounding the effective use of vertical integration may arise from differences in the phenomena under study. Economists have used aggregated industry averages, rather than observations of firms or business units (Bork, 1954; Kaysen & Turner, 1959). Usually these aggregates are sectoral or industry-level measures. One such measure is average industry value-added as a percentage of sales (Adelman, 1955; Gort, 1962). Another example is use of input-output tables to estimate industry-wide vertical integration (Clevenger & Campbell, 1977). Although some scholars of strategic management have examined vertical integration trends by comparing aggregate industry differences (Wernerfelt & Balakrishnan, 1984), others have looked at value-added within strategic business units (MacMillan, Hambrick, & Pennings, 1982) or at the relationships between SBUs (Harrigan, 1983).

To use vertical integration effectively, a firm may need to intervene to force commerce, or may even need to arrange temporary subsidy of one vertical stage that will benefit the total firm. For example, pioneering manufacturers of personal computers like Texas Instruments and Commodore invested at considerable expense in consumer electronics stores in the mid-1970s to demonstrate their products to wary and risk-averse consumers. When buyers had become familiar with personal computer products, the electronics firms ended their retailing activities. Such vertical arrangements are of great financial and strategic importance, and have been found to be important in earlier studies of corporate strategy.¹ Consequently, clarity regarding whether researchers have examined make-or-buy decisions (1) within one business unit's transformation stage or (2) between two business units at

¹ See Harrigan (1983) for a lengthy bibliography.



different processing stages in their research is desirable if we are to understand the implications of their findings.

This study gave special attention to the measures of vertical integration contained in the PIMS data base, an important data source that researchers have used to explore many questions of strategy and performance (Anderson & Zeithaml, 1984; Hambrick, 1983a, 1983b; Hambrick, MacMillan, & Day, 1962). PIMS measures, percentage of business unit purchases from other corporate units, and percentage of business unit sales to other corporate units were used to capture the intra-SBU relationship that a previous study (Harrigan, 1983) called degree of internal transfers. This approach differs from that of an earlier inquiry (MacMillan et al., 1982) that applied concepts of interorganizational dependence to explain firms' motives for integrating vertically. The present approach also should clarify some misunderstandings perpetuated by the misnaming of the variable that the PIMS data base calls vertical integration. Briefly, many dimensions of intrafirm activity may characterize vertical integration strategies. Most PIMS measures of vertical integration examine value-added in business units, not in firms. The variable PIMS calls vertical integration represents SBUs' value-added margins, or the differences between SBUs' purchase and selling prices for units processed within their boundaries of operations. This variable does not involve inter-SBU transfers at all.²

HYPOTHESES

The proportions of an SBU's requirements that will be obtained from upstream SBUs will vary with the maturity and competitive volatility of its industry. The proportion of its outputs transferred to downstream SBUs will also vary with industry maturity and competitive volatility. Relatively few internal transfers are expected where industry-wide demand is highly uncertain—before customer acceptance becomes widespread, for instance, or where demand is declining. More internal transfers are expected where demand appears to be growing. There should be a relatively low percentage of internal transfers where uncertainty concerning technologies and infrastructures—buyer-seller relationships, for instance—is high. This is for the same reason that low degrees of internal purchases and sales are expected if competition is intense. In short, this study hypothesized that inflexible positions involving assets and other resources that vertical integration often creates may imperil the strategic flexibility of firms.

Another hypothesis is that pioneering firms are exceptions. They are expected to use vertical integration to build infrastructures and educate customers about products' uses, as in the example of personal computers that appeared earlier in this paper. High degrees of interfirm transfers undertaken early will exacerbate the inherent riskiness of pioneering strategies.

²Previous studies of vertical integration (Harrigan, 1983, 1985a) created a specific dimension to capture differences in how firms define the boundaries of their SBUs; it was called breadth of activity per stage of processing.

Effective use of vertical integration to join industries whose plants vary in minimum efficient scale should be difficult; policies of high degrees of internal transfers could exacerbate capacity imbalances. Furthermore, firms that have bargaining power over upstream or downstream entities will not rely as heavily upon internal transfers in unfavorable industry settings as firms that lack bargaining power must. The major exceptions to this pattern should arise where firms can pursue strategies of cost leadership successfully. Under such circumstances, economies from vertical integration should provide cost leaders with benefits that will surpass the costs of excess capacity.

VARIABLES

Demand and Competitive Volatility

This study used PIMS variables to test the relationships sketched above. A long-term industry growth rate, based on four-digit Standard Industrial Classification (SIC) levels, represented industry wide demand outlooks. Expectations were that internal sales would be high where uncertainty concerning demand was low, and that the sign on this variable would be positive. An instability index, representing the range of changes in market share among competitors, measured competitive volatility; measures of investment intensity and the proportion of total SBU plants devoted to continuous process technologies also captured competitive volatility. Where the instability index was high, few internal transfers and a negative beta coefficient were expected. Investment intensity approximated the effects of high exit barriers. It captured the hypothesized riskiness of high capital intensity in SBUs' strategic postures when competition is volatile. A negative sign was also expected on this variable, since firms in volatile industries would undertake relatively few internal transfers. Continuous process technologies, which are often also connected with upstream or downstream stages of processing, represent stabilizing forces. A positive sign was hypothesized because more internal transfers seemed likely in tranquil settings than in volatile ones.

Bargaining Power

The proportion of total requirements an SBU purchased from its three largest suppliers represented upstream resource dependency. Percentages of SBUs' sales earned from single distribution channels represented dependence on those channels. Customers' dependence upon the SBUs under study was represented by the proportions of customer purchases that those SBUs represented. Porter (1976) used these variables to indicate the strength of an SBU's bargaining power over upstream and downstream entities. In this research, more internal purchases and a positive sign were expected where SBUs depended heavily on concentrated groups of suppliers. Fewer internal sales and a negative sign were expected where the outputs of the SBUs under study represented significant proportions of customers' purchases. A negative sign, denoting less vertical integration, was expected

because where such bargaining power was high, SBUs could sell their outputs advantageously through outsiders.

Corporate Strategies

This research tested two types of corporate strategy variables: (1) those representing the synergies that vertical integration is often hypothesized to embody, and (2) those representing corporate personalities. It was assumed that strong, corporate-wide policies to some extent influenced SBUs' managers, and thus affected how business units tended to compete. Measures of shared facilities and supervisors represented synergies arising from the scale economies of shared resources. Positive signs were expected, since intrafirm transfers might be undertaken to capture the synergies of such arrangements.

A set of dummy variables noted whether the parents of SBUs under study tended to embrace more or less vertical integration than their competitors. These dummy variables were transformed into an ordinal scale. Measures of relative price levels and cost structures—price-cost margins—were added to capture the SBUs' strategic postures. Positive signs, denoting high degrees of intrafirm transfers, were expected where firms tended to be more vertically integrated than their competitors. This expectation implies that SBUs' make-or-buy decisions reflect corporate policies. Negative signs, denoting relatively low degrees of internal purchases and sales, were expected where SBUs' prices were higher than those of their rivals.³ Negative signs were also expected for price-cost margins, reflecting the reality that there is not much sense in firms pursuing vertical integration if they cannot capture large value-added margins in doing so.

RESEARCH METHODS

Table 1 shows the dependent and independent variables that the models used, and summarizes hypotheses and expected signs. Table 1 also compares these variables with those used in a field study (Harrigan, 1983, 1985a). Ordinary least-squares regression equations served to test models of the percentages of internal purchases and sales.

Examination of degrees of intrafirm transfers used the PIMS data base, maintained by the Strategic Planning Institute. The business units in PIMS often belong to firms on the cutting edge of strategic planning practice. Although scholars have often criticized its confidential data tracking SBUs' behavior and performance (e.g., Anderson & Paine, 1980), PIMS remains an important resource for studies of competitive strategy. Moreover, although the discussion earlier in this paper indicated that many PIMS variables are not appropriate for researching most questions of corporate strategy—like vertical integration—the dependent variables selected for this study were adequate to test its hypotheses. The sample contained 1,280 observations

³As stated in the Hypotheses section, vertical integration is expected where there is effective cost leadership.

TABLE 1
A Comparison of Variables Used to Test Vertical Integration Strategy Hypotheses

Sample Based on Field Interviews	PIMS Construction	Hypothesis	Sample from PIMS Database
Dependent variables			Dependent variables
Percentage internal purchases	Percentage purchased from sister SBUs	PIMS variable matches Harrigan's (1985) degree of upstream internal transfers variable.	Percentage internal purchases
Percentage internal sales	Percentage sold to sister SBUs	PIMS variable matches Harrigan's (1985) degree of downstream internal transfers variable.	Percentage internal sales
Independent variables			Independent variables
Uncertainty variables			Uncertainty variables
Demand and technological uncertainty	SIC-group growth rate (percentage)	(+) Positive growth rates are expected to encourage intrafirm purchases and sales or resources.	Long term growth rates (SIC-group)
Competitive volatility variables			Competitive volatility variables
Height of economic exit barriers	No comparable PIMS variable	(-) Indicates stability of expected returns; the presence of high exit barriers makes competition more volatile (Porter, 1980).	Industry instability index (SIC-group)
- -	SIC-group index of market share instability (summation of percentage changes)	(-) Would be unimportant to pioneers who would forward integrate notwithstanding the uncertainties and turmoil.	
- -	Percentage continuous technology employed by SBU	(+) Continuous process technologies and accompanying physical interconnection expected to create more stable competitive environments, both conditions encouraging intrafirm transfers.	Percentage continuous technology

Table 1 (continued)

Sample Based on Field Interviews	PIMS Construction	Hypothesis	Sample from PIMS Database
Competitive volatility variables (cont.)			
--	Average book value divided by sales, plus value added at SBU level, both weighted by average net income	(-) High value-added inside SBUs reduces the value added obtained through vertical controls.	Investment intensity
Bargaining power variables			
Availability of alternate suppliers	Percentage indicates bilateral bargaining power	(+) Few alternate suppliers reduces upstream bargaining power and increases need for internal transfers.	Bargaining power variables Percentage of purchases from three largest suppliers
Availability of alternate distributors (or customers)	Percentage indicates bilateral bargaining power	(-) Few alternate distributors (or customers) reduces downstream bargaining power and increases potential need for internal transfers.	End user dependence
--	Percentage is another way to estimate power	(+) Heavy dependence upon a particular customer group reduces bargaining power and increases potential need for countervailing internal integration.	Percentage of revenues earned from distribution facility sales

Table 1 (continued)

Sample Based on Field Interviews	PIMS Construction	Hypothesis	Sample from PIMS Database
Corporate strategy variables			
Synergies with upstream businesses	Percentage shared facilities with upstream SBU's	(+) High synergies expected to increase the attractiveness of vertical integration.	Corporate strategy variables Shared facilities
Synergies with downstream businesses	Percentage shared facilities with downstream SBU's	(+) High synergies expected to increase the attractiveness of vertical integration.	Shared supervisors
--	Dummy variables indicating whether corporations tended to be more integrated than competitors	(+) Presence of tradition of higher vertical integration within parents would likely translate into higher internal transfers among sister SBU's.	More corporate integration
--	Ratio of SBU's' prices to competitors' prices	(-) A proxy for SBU's strategic postures; relatively low prices are more likely to be associated with cost leadership strategies and greater vertical transfers.	Price differential
--	Selling price growth less weighted cost growth	(-) Dwindling opportunities to capture value-added expected to reduce attractiveness of integration.	Price-cost margin

from 64 industries; these included food processing, textiles, paper, plastics, organic chemicals, fabricated metal products, electronic devices, and wholesaling. The SBUs obtained none, some, or as much as 90 percent of their supplies internally, and they made up to 50 percent of their sales internally. A few SBUs (14%) reported both upstream purchases and downstream sales. However, for most SBUs that transferred any resources in-house, the proportion of their resource requirements purchased in-house exceeded the proportion of outputs sold to in-house customers. Correlations among independent variables were not significant at the .05 level.

RESULTS

Table 2 reports standardized regression coefficients instead of natural coefficients in order to indicate the amount by which the coefficient of multiple determination would be reduced if a variable were eliminated from the regression. Coefficients' signs were as expected and they were statistically significant in most cases. In the model of purchases from upstream SBUs, the negative signs on the variables representing volatile competition suggest that firms would not sustain losses from high internal transfers in volatile settings, lest they incur excess capacity, high exit barriers, and other damages from too much vertical integration. The positive sign on the supplier power variable, percentage of purchases from three largest suppliers, suggests that where a few outside suppliers possessed bargaining power over SBUs, because there were few alternative vendors perhaps, defensive backward integration became likely. The positive signs on the shared resources variables suggest that more internal transfers occurred where synergies from sharing were available than where they were not. The positive sign of the relative level of corporate vertical integration variable suggests that where corporate cultures encouraged vertical integration, relatively high degrees of intrafirm transfers were likely to occur. The negative sign of the price-differential variable, indicating relative price levels, suggests that business units selling differentiated, premium-priced goods appealed to smaller volumes of customers than firms need if they are to enjoy integration economies. The negative sign on the variable for price-cost margins suggests that falling price-cost margins exerted pressures upon SBUs to eliminate those arrangements, such as vertical integration, that penalize their profitability. This result may also suggest that falling margins decrease the attractiveness of intrafirm transfers because there is less value-added to capture.

Testing the model of internal sales yielded many of the same results, as Table 2 shows. The positive sign of the variable for long-term growth rate suggests that when sales growth trends are positive, more downstream integration is likely to occur. The positive sign on the variable for continuous process manufacturing technology suggests that physical interconnection of vertically related stages of activity could stabilize competition because of the high switching cost barriers such arrangements create. The positive sign on the customer importance variable, percentage of revenues earned from distribution facility sales, suggests that defensive vertical integration may be

TABLE 2
Results of Regression Equations on Internal Transfers
between Sister Business Units^a

Independent Variables	Dependent Variables	
	Percentages of Internal Purchases	Percentages of Internal Sales
Uncertainty		
Long term growth rate	—	.035
Industry volatility		
Industry instability index	-.080**	—
Percentage of continuous process technology	—	.043*
Investment intensity	-.133**	—
Bargaining power		
Percentage of purchases from three largest suppliers	.109**	—
End user dependence upon the SBU under study	—	-.110**
Percentage of revenues earned from distribution sales	—	.075**
Corporate strategy		
Shared facilities	.040	—
Shared supervisors	.337**	.350**
More corporate integration than competitors	.204**	.194**
Price differential relative to competitors	-.050*	-.102**
Price-cost margin	-.056*	—
Coefficient of multiple determination ^b	.213	.207
F-statistic	38.17**	39.38**
(degrees of freedom)	(3,1271)	(7,1272)
Mean value of dependent variable	11.6	4.0

^aData are from the PIMS data base; standardized beta coefficients are reported.

^bCorrected R²

* $p < .05$

** $p < .01$

used to counter the bargaining power of concentrated and powerful outsiders. The negative sign on the customer dependence variable suggests that where end users are strongly tied to the business unit, perhaps by high switching costs or lack of viable alternative vendors, those SBUs can use outsiders advantageously; hence, internal transfers will be low.

CONCLUSIONS

These results offered additional evidence that vertical integration is not a homogeneous strategy that all firms use in the same manner under all circumstances. The results generally agree with those previous studies (Harrigan, 1983, 1985a) that tested the same hypotheses with field data. Relationships exist among uncertainty, competitive conditions, bargaining

power, and the types of internal transfers that firms' corporate strategies might deem necessary. This partial replication of previous results suggests that PIMS variables offer acceptable measures of degrees of internal transfers between upstream and downstream business units, two of the several dimensions that characterize firms' vertical integration strategies.

Care must be taken in interpreting these results and those of other studies concerning vertical integration strategies. Such interpretations rely on whether the variables used to measure the relationships can adequately capture the synergies, integration economies, and other attributes of vertical integration strategies. Since some researchers have obtained results suggesting that vertical integration is not rewarding, it would seem that more research on the problem of measuring intrafirm transactions, benefits, and costs is needed in order to determine whether the values of the alleged synergies of vertical integration have been overrated.

Finally, these results suggest that managers should consider the natures of their industries' structures, competitive behaviors, and ways of maximizing their bargaining power when evaluating make-or-buy decisions. SBUs that are vertically related to each other need not have buyer-supplier relationships unless having them makes economic or strategic sense. Since SBUs' bargaining powers can attenuate with time, it is useful to recognize when vertical integration is especially advantageous to firms' corporate purposes and when economic considerations alone justify its use. Although firms that cultivate vertical relationships often do so to control their needs for certainty, these results suggest that low internal integration can be more appropriate than high where firms' internal attributes or environments are not suited to highly integrated strategies.

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MODE OF CORPORATE DIVERSIFICATION AND ECONOMIC PERFORMANCE

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This study is an extension of previous research on diversification strategy and performance in large, multibusiness corporations. Multibusiness corporations can use two pure diversification strategies: (1) internal diversification, relying on development of products or services, or (2) external diversification, relying on the acquisition of other firms. Although corporations could also pursue mixed diversification strategies, combining these two modes, Pitts (1980) posited that successful firms do not mix strategies. Previous research (Berg, 1973; Pitts, 1974, 1976, 1977) studied populations of successful multibusiness firms consisting of only two groups, each characterized by the use of one pure diversification strategy; these studies focused on the ways internal and external diversifiers structured their firms. No study has examined diversification strategies in a random sample of multibusiness industrial firms, or reported associated economic performance measures. Thus, the two-strategy view of successful multibusiness firms remains an untested—yet testable—assertion. This study tested two hypotheses:¹

Hypothesis 1: Multibusiness firms diversify into new businesses using one of two approaches—either internal development or acquiring other companies—and avoid mixed approaches.

Hypothesis 2: Multibusiness firms following mixed diversification strategies, if they exist, will experience lower economic returns than either internal or acquisitive diversifiers.

An earlier version of this paper was presented at the annual meeting of the Academy of Management, Boston, August 1984.

¹More research is needed to identify other structural differences associated with choices of diversification modes. Such differences may involve the sizes and composition of staff in divisions; formal and informal information flows; degrees of horizontal and vertical specialization between and within divisions; and other factors. However, in our opinion, such research must be considered premature in light of the lack of testing the two-strategy view has received. Therefore, this research effort did not address structural characteristics of multibusiness firms.

METHODS

The Target Population

The relevant population for this study consisted of all large, highly diversified industrial firms actively involved in diversification between 1977 and 1981. We defined a research population for sampling purposes in a manner that was consistent with Pitts's (1974, 1976, 1977, 1980) work. We used the 1982 *Fortune* 500 for sampling, thus operationally defining the term large. Moreover, using this list (1) limited the population to be sampled to firms primarily involved in industrial activities in the United States; (2) insured the availability of publicly disclosed information; and (3) was consistent with all of the previous studies on internal and acquisitive diversification. In Pitts's most recent study on this topic, he defined a highly diversified firm as "one which operated in at least six different business areas, the largest of which accounts for less than 60 percent of the total corporate sales" (1977: 203). In this research, we operationally defined a business area as a four-digit Standard Industrial Classification (SIC) code. Diversification research has traditionally used SIC codes because of their inherent objectivity and reliability. Other studies (Montgomery, 1982) have supported the validity of SIC codes in diversification strategy research, particularly at the four-digit level of specificity. More important, we chose this level of specificity because it most closely resembles Pitts's notion of business area.

Active involvement in diversification was the final criterion for our relevant population. Unfortunately, no appropriate operational definition of active existed to serve as a guide. Previous studies have never reported, much less quantified, diversification activity. To insure that firms were diversifying during the five-year period chosen for this study, we looked at changes in SIC codes. If a firm diversified into at least one new four-digit SIC code between the beginning of 1977 and the end of 1981, we included the firm in the sample.

In summary, any firm meeting the following criteria was considered to be in the relevant population of multibusiness firms:

1. It was a member of the 1982 *Fortune* 500.
2. It operated in business areas having at least six different four-digit SIC codes in 1981.
3. The largest SIC-code business area accounted for less than 60 percent of total corporate sales in 1981.
4. It had added at least one new SIC-code business area between 1977 and 1981.

These were the minimum requirements for inclusion in the population for sampling; the firms examined in this study were in fact more diversified and more actively diversifying than these requirements might indicate. For example, 23.9 was the average number of four-digit SIC codes in which sampled firms conducted business in 1981, whereas the minimum required was six. Similarly, on the average, firms diversified into eight new four-digit

SIC codes between the beginning of 1977 and the end of 1981, but one new code was the minimum.

Sampling

We randomly selected firms from the 1982 *Fortune* 500 until there were 50 that met the sampling criteria. We used *Standard and Poor's Register* (1977-81) and 10-K reports (Disclosures, Inc., 1981) to determine an appropriate sample. On the basis of estimates of sample sizes found in Cochran (1963), we considered a group of 50, or 18 percent of the target population, sufficient, given this study's focus.

Measures

Diversification strategy. In order to test the two hypotheses, measures of diversification strategy and economic performance were needed. Of primary concern were the relative frequencies with which firms employed internal and external diversification strategies when they entered new businesses. Pitt's (1980) conceptualization of a continuum between purely internal and purely external strategies required that a measure of relative frequency be continuous and proportional. To capture this notion of relative frequency, we devised a new measure using four-digit SIC codes:

$$\text{Frequency of acquisition mode} = \frac{\text{Number of new SIC codes attributed to acquisitions}}{\text{Total number of new SIC codes}} .$$

We considered firms to be operating in new SIC-code business areas if they conducted business categorized under particular four-digit SIC codes at the end of 1981, but had not conducted those businesses at the beginning of 1977. Acquisitions had the status of new SIC-code businesses if they met the following conditions: (1) the acquiring firms were not involved in activities under these particular SIC codes at the time of acquisition, and (2) the acquired companies were doing business in these particular SIC codes at the time of acquisition. This measure represented how much of firms' diversification activities, or expansion into new SIC codes, was attributable to acquisitions of other firms; it represented the relative frequency of diversification through internal developments by default. For example, if a company diversified into six new business areas in the five-year period yet made no acquisitions, its score would be zero and we could infer that it had diversified internally. The range of possible scores on this measure is continuous between 0 and 1, with the midpoint of .5 representing a balance between the two modes of diversification. However, this measure does not control for absolute levels of diversification activity. For example, acquisitive diversifiers may not be more acquisitive than other firms in absolute terms, in that they may not actually acquire greater numbers of businesses. For this reason, we included level of diversification activity, represented by total number of new SIC codes, as a separate variable in the analysis.

Economic performance. For each firm, economic performance between 1977 and 1981 was measured in four ways: by the average annual (1) growth in sales, (2) return on assets (ROA), (3) return on investments (ROI), and (4) return on equity (ROE). We used averages to reduce variability in the data and to provide pictures of overall economic performance during the period. These measures were not arbitrary choices. Diversification is often a growth strategy. Whereas internal development projects often require long time periods before yielding positive returns (Biggadike, 1979; Burgelman, 1983; Fast, 1978), acquisitions will, in most cases, instantaneously increase the acquiring firm's revenues. Therefore, there should be significant differences in sales growth between those firms that primarily diversify through internal means and those firms that primarily acquire ongoing businesses. Yet previous studies of internal and acquisitive diversification (e. g., Pitts, 1974) that relied on selected salesgrowth figures asserted that internal and external diversification strategies were equally effective for growth. Hence, we also included changes in total corporate sales in the analysis. ROA, ROI, and ROE incorporate firms' levels of profitability and represent measures of relative efficiency across the sample. More important, ROE and, to a lesser extent, ROI are sensitive to differences in debt structure across the sample. ROA, calculated on the basis of operating incomes before taxes and interest, is a more robust measure than either of the other two (Brealey & Myers, 1984). Firms may finance internal and external diversification activities differently. Because most acquisitions are time-sensitive, it would seem that firms would finance such moves by debt rather than by stock issues. Including measures that varied as to their sensitivity to financing modes such as long-term debt and stock issues allowed us to control this potential confound and estimate its effects.

Data Collection

For each of the 50 firms in the original sample we compiled a file of archival data from several sources. Included were: (1) lists of firms' divisions and subsidiaries that existed between 1977 and 1981, drawn from *Standard and Poor's Register* (1977-82) and from 10-K reports (Disclosures, Inc., 1978-82); the range was from 5 to 56; (2) acquisition information obtained from the Conference Board's *Announcements of Mergers and Acquisitions* (1978-82) and *Predicasts F & S Index of Corporate Change* (1977-82), and then verified by 10-K reports (1978-82); and (3) financial data collected from 10-K reports (1978-82) and *Moody's Industrial Manual* (1978-82). Obtaining SIC codes for acquired companies proved to be a problem in the data collection process, because adequate data were not available for young or small firms that had been acquired. We dropped eight firms from the sample for this reason.

RESULTS

Figure 1 illustrates the distribution of diversification strategy scores. We found continuous distribution between purely internal and purely acquisi-

FIGURE 1
Diversification Strategy Distribution

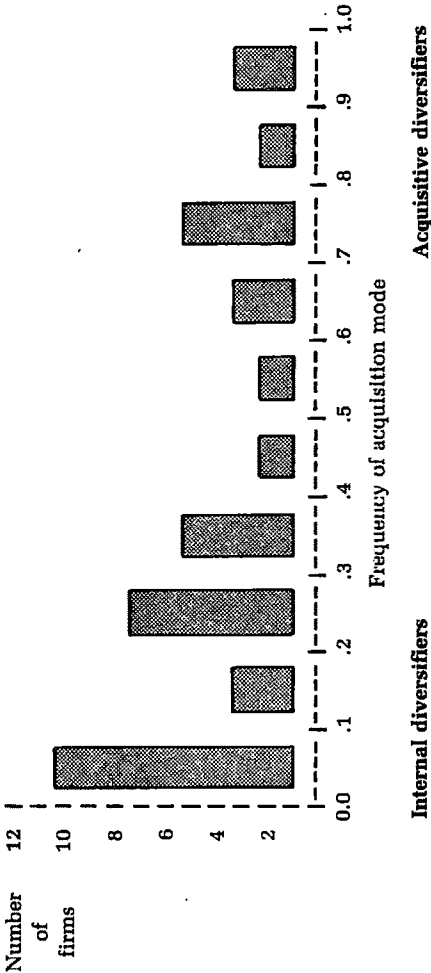


TABLE 1
Summary of Results of Cluster Analysis

Strategy Groups	Mean Strategies	Standard Deviations	Ranges
Internal diversifiers (n = 19)	.0789	.1198	.000-.250
Mixed diversifiers (n = 15)	.4873	.1527	.285-.700
Aquisitive diversifiers (n = 8)	.8686	.1408	.722-1.00

tive diversification strategies. Our strategy measure did not permit a valid a priori classification of firms according to Pitts's (1977, 1980) types—internal, acquisitive, and mixed diversifiers. Thus, the next step in the analysis involved grouping firms into strategy categories.

We used nearest centroid sorting, a disjoint clustering algorithm based on Euclidean distances. This clustering method divides observations into a specified number of clusters such that every observation belongs to one and only one cluster; it is useful when grouping along a single dimension (Anderberg, 1973). We sorted firms into one of three groups depending upon whether their strategy scores were closer to 0.0, internal diversification; 0.5, mixed; or 1.0, acquisitive diversification. Table 1 summarizes the results of the grouping procedure.

We used multivariate analysis of variance to determine if there were differences across the groups in *absolute* levels of diversification activity and on economic measures. We found no significant differences with respect to levels of diversification activity. Table 2 presents each group's mean score and standard deviation on the measures of economic performance and of level of diversification. The scores of the internal diversifiers showed greater variability than the other two groups did on the economic performance measures, especially on ROE. One measure, ROA, was statistically related to mode of diversification by conventional standards: two measures, ROE and growth in sales, showed differences that approximated significance ($p = .0631$ and $.0556$, respectively).

We used the Tukey-Kramer method (Kramer, 1956; Tukey, 1953) in a pairwise comparison of means on the ROA measure. One comparison was found significant at the .05 level; the mean ROA of internal diversifiers was significantly different from the mean ROA of acquisitive diversifiers. The performance of mixed diversifiers was not significantly different from that of either of the other two groups.

DISCUSSION

The results offered no support for either Hypothesis 1 or Hypothesis 2. Of the firms examined in this study, 36 percent adopted mixed approaches when entering new businesses, combining internal developments with acquisition of other companies. The performance of mixed diversifiers was not statistically different from the performance of acquisitive and internal diversifiers on any of the economic measures.

TABLE 2
Summary of MANOVA Results

Variables	Group Means ^a			<i>p</i> ^b
	Internal Diversifiers	Acquisitive Diversifiers	Mixed Diversifiers	
Return on investment	5.66 (4.12)	7.84 (3.32)	8.38 (2.11)	.1061
Return on equity	9.85 (11.87)	15.48 (2.72)	17.08 (3.03)	.0631
Growth in sales	11.29 (10.48)	15.22 (5.67)	19.65 (8.72)	.0556
Return on assets	7.35 (1.90)	5.26 (1.19)	6.06 (1.81)	.0250
Level of diversification	6.00 (4.10)	9.25 (10.84)	9.86 (5.55)	.1854

^aFigures in parentheses are standard deviations.

^bAs determined by *F* tests.

Burgelman (1983) argued that large, diversified firms can easily engage in many strategic choices (Child, 1972). This study provides a preliminary indication of the range of choices that managers in this type of firm can and do use as they diversify. The distribution of firms along the strategy continuum appeared to be both continuous and skewed to the right, rather than bimodal, as had been previously reported. Since this study made no attempt to determine why firms adopted particular diversifying approaches, the reasons for the apparent preference for internal development in this sample of firms are not clear. One possible explanation is the time period studied, 1977-1981. Bacon and Butler (1981) argued that overall acquisition activity will be lower in periods of high interest rates. Thus, the skewedness we observed may or may not be found in other five-year periods. The stability of the aggregate diversification pattern over time remains an empirical question.

Two observations about risk are worth noting. The first concerns the apparent discrepancies found in the performance figures across the three groups. Acquisitive and mixed diversifiers may be posting higher sales growth figures than internal diversifiers at a price, namely higher financial leverage. The pattern of mean economic performance across the three groups on the ROI, ROE, and sales growth measures was nearly opposite on the ROA measure, which is a relative performance indicator considered robust to differences in debt structures. This suggests that the ROI and ROE measures may not have captured relative performance differences, but rather differences in debt structures associated with modes of diversification. The second observation on risk concerns the variability in performance associated with modes of diversification. The performances of internal diversifiers were erratic. Even though internal diversifiers enjoyed modestly higher

ROA figures than the other two groups,² they posted ROE and sales-growth figures that were widely dispersed, representing the best and the worst of the entire sample of firms studied. The acquisition mode was associated with the least within-group variance on each of these measures. In organizations where minor deviations in performance involve losses or gains of millions of dollars, these differences cannot be ignored.

This study suggests that Pitt's 1980 contingency theory, although parsimonious, may oversimplify the relationships among diversification strategy, structure, and economic performance. Unfortunately, or fortunately, the findings reported here raise more questions than they answer. What structures do mixed diversifiers use? Does structure contribute to performance? Are modes of diversification stable over time? What effects do firms' portfolios of business have on their choices of approach? Do different strategies yield different economic returns in the longrun? These are but a few of the questions future research might address in this important, yet empirically barren line of inquiry.

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²Their ROAs were significantly different, in statistical terms, from those of acquisitive diversifiers.



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THE IMPACT OF INFORMATION ON JOB CHOICES AND TURNOVER

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Common sense and empirical research suggest that when individuals use accurate information as a basis for decision making, they make better decisions than they might without such information. Several studies have supported the notion that when relevant information is available to decision makers, the accuracy of their decisions improves (e. g., Porat & Haas, 1969; Streufert, 1973). Similarly, studies have indicated that irrelevant information can lower decision making performance (e. g., Manis, Fichman, & Platt, 1978).

Although accurate information is necessary for effective decision making, several factors can make it difficult for individuals to successfully acquire and use such information. O'Reilly (1982) found that the accessibility of an information source rather than its quality was often a better predictor of individuals' use of that source. Similarly, individuals differ in preferences for various types of information (Borgida & Nisbett, 1977) and in processing ability (Slovic, Fischhoff, & Lichtenstein, 1977; Taylor & Dunnette, 1974). Thus, individuals' abilities to find and process information and their preferences may limit their use of sources most capable of providing accurate information.

Similarly, organizational factors can limit individuals' access to accurate information. O'Reilly and Roberts (1977) noted that structural properties can affect the accuracy of information transmitted within a workgroup. Moreover, certain information may undergo intentional or unintentional distortion that preserves an organizational image (Caldwell & O'Reilly, 1982) or presents an organization positively (Wanous, 1980). Thus, both individual and organizational factors may lead people to rely on information sources that are less than accurate.

Both the accuracy of information and its sources have important effects on individuals' job choices. Research on realistic recruiting practices has suggested that if individuals make job choices with artificially high expectations of what they will experience at work, lower satisfaction and higher turnover are more likely than with realistic expectations (Wanous, 1976, 1977). A review of 11 recent studies (Reilly, Brown, Blood, & Malatesta, 1981) reported that turnover was significantly lower than expected across studies for individuals who had received realistic job preview information. This suggests that when individuals choose jobs using accurate information, their decisions are better than if they use artificially positive or inaccurate information. Because organizations may for many reasons—pressures on hiring or particular reward systems, for instance—present unrealistically positive pictures of jobs, individuals may need to draw on information from many sources both inside and outside organizations to develop accurate pictures of jobs and their settings (Louis, 1980).

Although overall reviews of effects of realistic job information generally support its value, substantial variability exists among studies. This led Popovich and Wanous (1982) to argue that further research on effects of early job information should focus on variables related to the communication of such information. The purpose of this study is to investigate the extent to which both accurate information about new jobs and use of formal and personal sources of job information are related to subsequent turnover. Investigating individuals' use of information in making job decisions has its problems, because later reports of initial information regarding jobs are open to retrospective interpretation. For example, people who are unhappy in their jobs may blame that unhappiness on having had inadequate information before they accepted rather than on poor personal decision making. Since some evidence exists that individuals will try to justify job choices

(O'Reilly & Caldwell, 1981), any post hoc study of job applicants' information use must take individuals' reactions to jobs into account. Without accounting for these individual reactions, we cannot separate prospective use of information from retrospective reports of use of information.

This study tested three general hypotheses. First, we predicted that individuals who reported having received accurate information about their jobs would show lower turnover levels than those who reported receiving inaccurate job information, independent of initial reactions to the jobs. The second hypothesis was somewhat related to the first. Since information sources can vary in both the extent to which individuals use them and the degree to which they provide useful information, we expected that individuals who drew extensively upon sources that did not provide useful job information would have higher turnover rates than those who relied on more useful sources. Third, we predicted that the extent to which individuals believed they had accurate information about their new jobs would be positively related to the extent to which they used various personal or formal sources of job information.

METHODS

Participants and Procedures

Data came from a survey of graduates of the M.B.A. program at a state university (O'Reilly & Caldwell, 1981). We distributed questionnaires to 171 graduates (time 1) and got back 108 usable responses from individuals who had accepted but not started full-time jobs; the response rate for this first survey was 63 percent. All respondents had been full-time students; their mean age was 26.4 years and their mean number of years of previous full-time work experience was 3.1. Six months later, we surveyed these 108 respondents on the accuracy of information they had received about their new jobs (time 2). Questionnaires were returned by 101 respondents for a time 2 response rate of over 93 percent. Twenty-four months after the time 1 survey, we contacted 97 of the 108 subjects to determine whether or not they had changed firms; this time 3 response rate was nearly 90 percent. We had informed individuals who completed the time 1 survey that we would survey them again, but did not tell them when or about what they would be surveyed.

Time 1 Survey

Information source use. Through interviews with the staff of the university's M. B. A. Placement Center, we identified four sources that students might regularly use to obtain information about particular jobs. These were: (1) company documents, such as brochures, annual reports, and the like; (2) library research on companies, their executives, and so forth; (3) informal discussions with faculty and other students; and (4) discussions with people in the relevant industries. Respondents indicated the extent to which they used each source on 7-point scales. A principal components

analysis of the four items yielded two relatively unambiguous factors. The first factor, use of personal sources, was defined by the item assessing the extent of discussions with faculty and other students and by the item assessing discussions with industry sources. The correlation between these two items was .56 ($p < .01$). The second factor, use of formal sources, was defined by the items assessing use of formal documents and library sources ($r = .56$, $p < .01$). We computed indices for each factor by summing responses to the appropriate items; the correlation between the two indices was .32 ($p < .01$).

Time 2 Survey

The time 2 survey asked about: (1) the accuracy with which information sources had presented various aspects of jobs, (2) the extent to which various sources had provided useful information, and (3) the degree to which individuals' initial expectations about jobs had been met.

Accuracy of job facets. Individuals had been employed approximately six months when they took the time 2 survey. This survey asked the extent to which seven job facets had been accurately presented before offers were accepted. These facets were: (1) salary and benefits, (2) career paths, (3) content of work, (4) working conditions, (5) co-workers, (6) level of responsibility, and (7) training. A separate 7-point scale measured accuracy of each facet. A principal components analysis yielded a single factor, so we summed the seven accuracy questions into a single score ($\alpha = .87$).

Usefulness of information sources. Since the information individuals could receive about jobs could vary in terms of how useful it actually was in helping them make job decisions, the time 2 survey assessed perceived usefulness of various information sources. Two questions, "How useful was information from written materials in helping you to decide to accept the job?" and "How useful was information from others in helping you to decide to accept the job?" measured formal and personal information sources, respectively. Respondents used 7-point response scales; the correlation between these items was .24 ($p < .01$).

Met expectations. A single question measured the degree to which individuals' initial expectations of jobs were met. High responses on a 7-point scale indicated that jobs exceeded initial expectations; low responses indicated that they did not meet initial expectations; and the midrange indicated that jobs met expectations. We used this question to control for retrospective interpretation of information use by removing the effects of met expectations from the relationship between the information variables and turnover.

Time 3 Survey

Turnover. At time 3, respondents returned cards indicating whether they were still working for the same firms they had selected at graduation. We received 66 responses; telephone calls to the firms of the remaining 42 participants yielded employment verification for 31 more individuals. There were 66 stayers and 31 leavers, for a turnover rate of approximately 32 percent.

RESULTS

Table 1 shows means, standard deviations, and zero-order correlations among the variables. Several factors are worth noting. First, the extent to which expectations were exceeded was positively related to perceived overall accuracy of information ($r = .27, p < .01$) and negatively related to turnover ($r = -.21, p < .01$). Second, the extent to which individuals consulted formal and personal sources to obtain job information was positively related to how useful those sources were perceived to have been in making job choices six months later (formal sources, $r = .40, p < .01$; personal sources, $r = .29, p < .01$).

The first hypothesis stated that accurate information about jobs would be related to subsequent rates of turnover, independent of the extent to which initial job expectations were met. The zero-order correlation between accuracy of information and turnover was $-.44 (p < .01)$. With regression analysis to control for the effects of met expectations, the part correlation between accuracy and turnover dropped only slightly to $-.39 (p < .01)$. Thus, individuals who reported getting accurate pictures of jobs were less likely to have left organizations 18 months later than were those who reported receiving inaccurate information.

The second hypothesis concerned interaction between the degree to which individuals used sources and the extent to which those sources influenced behaviors. Information sources should have been more influential when they had received extensive use than when they had been little consulted. We used moderated multiple regression to test this hypothesis computing separate regression equations for turnover for both personal and formal information sources. For both equations, we entered met expectations in the first step, and levels of information source use and usefulness of sources in the second step. We entered the product of the two terms, extent of use \times usefulness, in the third step. Results for both formal sources ($R^2 = .19, p < .01$) and personal sources ($R^2 = .27, p < .01$) explained significant amounts of variance in turnover. Analysis of the incremental steps in the regression equations yielded the following results. For both equations, met expectations was a significant predictor ($\beta = -.21, p < .05$; $R^2 = .04$). Neither amount of use nor usefulness of sources were significant for either formal sources ($R^2 = .08$) or personal sources ($R^2 = .06$). However, the interaction terms were significant for both the formal source equation ($\beta = -1.05, p < .01$) and the informal source equation ($\beta = -1.06, p < .01$). Graphical representation of these interactions supported the second hypothesis and showed that turnover was highest for individuals who had extensively consulted sources that did not provide useful information.

To provide an overall test of the effects of the information variables on subsequent turnover, we used discriminant analysis. Table 2 shows the results of this analysis. Overall, these results confirm the relationship of accurate information and turnover independent of the degree to which expectations were met. They also show the relative degrees of importance of personal and formal sources in influencing subsequent turnover.

TABLE 1
Means, Standard Deviations, and Correlations
among all Variables^a

	\bar{x}	s.d.	1	2	3	4	5	6
Information source use (time 1)								
1. Formal	9.60	3.16	—					
2. Personal	9.58	3.28	.32***	—				
Usefulness of sources (time 2)								
3. Formal	3.29	1.92	.40***	.16	—			
4. Personal	4.73	1.99	.03	.29***	.24***	—		
Accuracy of information (time 2)								
5. Overall accuracy	33.40	9.54	.15*	.10	.33***	.40***	—	
Initial expectations (time 2)								
6. Met expectations	4.36	1.30	-.11	-.07	-.02	.04	.27***	—
Tenure (time 3)								
7. Turnover (1 = stayers, 2 = leavers)	—	—	-.02	.07	-.19**	-.12	-.44***	-.21***

^aN = 97

* $p < .10$

** $p < .05$

*** $p < .01$

TABLE 2
Results of Discriminant Analysis

Variables	Group Means		<i>F</i>	<i>p</i>	Standardized Discriminant Weights
	Stayers	Leavers			
Information source use					
Formal	9.60	9.61	0.00	<.98	-.04
Personal	9.65	9.42	0.08	<.77	-.10
Usefulness of sources					
Formal	3.53	2.73	3.24	<.08	.21
Personal	5.13	3.81	8.72	<.01	.49
Accuracy of information	35.58	28.35	11.75	<.01	.32
Met expectations	4.70	3.65	14.57	<.01	.68
Centroid (standardized)	0.29	-0.68	15.40	<.01	-
Classification rate = 76%, $R^2 = .22$.					

The third hypothesis related use of information sources at time 1 to the accuracy of job information at time 2. As Table 1 shows, results did not support this hypothesis. The perceived accuracy of job information was marginally related to use of formal sources ($r = .15$, $p < .10$) and unrelated to use of personal sources ($r = .10$, n.s.).

DISCUSSION

The results of this study show that individuals who report that they have received accurate information about jobs are less likely to leave their organizations than are those who have received inaccurate information. Similarly, individuals who found the sources of information they consulted to make their job choices useful were less likely to leave jobs than those who found the information sources less useful. This finding is particularly interesting given our measure of turnover. Since we did not separate voluntary and involuntary leaving, results may understate the actual effects of accurate information on individuals' decisions to stay in organizations. Lumping people who left against their will with those who left voluntarily increases the variability of the turnover group and may mask potential findings.

Although these findings suggest that information influences turnover, an alternative explanation may pertain. It is possible that individuals who are relatively dissatisfied will selectively recall information or distort it to show that they got inaccurate pictures of jobs. These same individuals may also be more likely to quit than relatively satisfied individuals. Thus, a retrospective interpretative process may explain our results. We cannot completely discount this explanation, but find it unlikely. Collecting data on the extent to which expectations were met allowed us to statistically control early job reactions that could possibly have led to retrospective interpretations.

The part correlations and the results of both discriminant analysis and regressions suggested that the information variables influenced turnover, independent of the extent to which individuals' expectations regarding jobs were met. Thus, although there is evidence that postdecisional justification and job tenure are associated (O'Reilly & Caldwell, 1981), the analyses reported here also show the effects of accurate information on turnover.

Individuals who report having had accurate pictures of their new jobs are less likely to subsequently leave their organizations than are those who report inaccurate pictures. This finding is consistent with the literature on unrealistic expectations (Wanous, 1977, 1980). The interaction between the extent to which individuals used sources of information and the perceived usefulness of those sources further suggests that job expectations may depend jointly on these two factors.

The failure to establish a relationship between differential use of formal and personal information sources and the perceived accuracy of information suggests that individuals may use complex sets of information sources to obtain job information. This interpretation is in line with Louis's (1980) contention that newcomers use a variety of processes and many methods of acquiring information to make sense out of organizations.

In general, these results are also consistent with previous research on information use and individual decision making. If the fact that individuals stay in chosen jobs suggests that they made better decisions, then level of source use and accuracy of information are both associated with improved decision making (O'Reilly, 1983). Results of the discriminant analysis showed that stayers reported having had more accurate initial information than leavers. Further, the discriminant analysis showed personal sources to have been more useful for stayers than for leavers. This finding is compatible with a number of studies that have suggested that under conditions of high uncertainty, such as job change, individuals are more likely to rely on verbal, personal, information sources than on formal sources (Randolph & Finch, 1977; Tushman & Nadler, 1978). The present study indicated that both formal and personal information sources may be useful, which suggests that individuals may vary in their preferences for sources as well as in their abilities to process information from various sources (O'Reilly, 1982).

Several cautions apply. First, our use of self-reported measures of information accuracy may be problematic, despite the longitudinal data collection. Moreover, this study did not differentiate types of turnover. Finally, it did not fully address the manner in which individuals process information and how that processing affects job decisions. Our findings do, however, point out the potential value of studying job choices and formation of expectations from a communication perspective. How individuals respond to different information sources, and how they perceive the usefulness and accuracy of those sources, appear to be related to individuals' reactions to their jobs. These results support Popovich and Wanous's (1982) suggestion that the use of communication variables may lead to improved understanding of the influence of early job information on individual satisfaction and tenure.

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TEMPORAL STABILITY AND RESPONSE-ORDER BIASES IN PARTICIPANT DESCRIPTIONS OF ORGANIZATIONAL DECISIONS

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The use of retrospective reports from informants who were participants is a common research procedure in studies of innovation, business policy formulation, organizational change, and other decision-related processes or events. Although such reports are important sources of research data, few field studies have examined their reliability and validity (Huber & Power, 1985; Phillips, 1981). This paper reports the results of a field study that investigated retrospective reports from participants in organizational decisions for temporal stability and response-order biases.

TEMPORAL STABILITY

Temporal stability refers to the stability of the content of reports across time. It is conceptually similar to test-retest reliability, but is primarily a function of intervening events rather than of random cognitive errors. Temporal stability is an especially important form of data reliability in field research.

Since it appears that the forces favoring stability of recall are stronger than those that undermine it, the relevant hypothesis is stated in its null form.

Hypothesis 1: The content of retrospective reports concerning organizational decisions will be stable across time.

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The time that elapses between the making of a decision and the reporting of it is also an important variable that may affect temporal stability. The replicability of the content of informants' reports might decrease with time as a consequence of (1) forgetting, (2) dissonance reduction, (3) reinterpretation prompted by previously unavailable information, (4) reduction of distortions caused by initial emotional reactions, and so forth. On the other hand, many events studied with retrospective reports are important to the informants, are experienced over significant periods of time, or are discussed with co-workers. Such events are likely to be recalled reliably. Frequent discussion of events may even cause retrospective reports to increase in stability across time, rather than decrease. The relative validity of these arguments is an important empirical question. Thus the second hypothesis concerns possible variations in temporal stability as a function of time elapsed between when decisions are made and when they are reported on.

Hypothesis 2: The stability of retrospective reports concerning organizational decisions will not vary across time lapses of moderate duration.¹

Finally, assuming that information important to informants may be conspicuous in their minds, and that they would therefore recall it more reliably than other information, it is expected that:

Hypothesis 3: The reliability with which data are included in retrospective reports will be positively associated with an informant's perception of the importance of these data.

In studies where researchers wish to use retrospective reports to study issues other than their informants' views of the importance of certain matters, this informant bias could be a serious source of research error.

RESPONSE-ORDER BIAS

Response-order bias is bias in a datum's content that is associated with its position in a sequence of data. It has implications for (1) how many items of information investigators should seek from informants; (2) how the ordinal positions of items in a sequence should affect interpretation of the items; and (3) how comparable are studies with informant reports of different lengths. For example, if an informant identifies four arguments that contributed to a decision, are the first two mentioned somehow different from the next two? Research suggests that the answer is yes; items listed early are likely to be those that were vivid when they entered informants' memories (Nisbett & Ross, 1980). Or they are items that seem less risky to disclose than other data (Delbecq, Van de Ven, & Gustafson, 1975: 49). Response-order bias is also important because the following factors under the interrogator's control can influence it: (1) instructions concerning the number of responses interroga-

¹In this study the time lapses varied from: 1 to 88 months; the median number of months was 7 and the mean was 19. In the context of the study, I consider such lapses to be of modest duration. The lapses were long enough that intervening events could have influenced stability of the reports. They were short enough that the aftermath of the decision, that is the project, was still present as a factor potentially affecting informant recall.

tors desire; (2) rewards associated with relatively extensive reporting; or (3) time allowed for responding.

In this study, three variables were hypothesized to affect response-order bias. One was importance. Because important items are more easily recalled, they were expected to be among the first items to be reported.

Hypothesis 4: Items perceived by an informant to be more important will be reported earlier in a sequence of items than will items perceived to be less important.

The second variable concerns ownership. Individuals might mention early in a sequence those items that they developed personally because of pride of ownership. Or they might mention items of public information early in order to appear informed. Both these arguments are speculative; even if they are valid, they might result in equally strong but opposing forces.

Hypothesis 5: Items concerning personally-developed knowledge will not be systematically distributed in a sequence of items.

The third variable concerns whether response items identify needs to solve problems or means to solve problems. We refer to the first type as problem-related items, and to the second type as solution-related items. Since describing problems before describing solutions often reduces communication effort, it is expected that:

Hypothesis 6: Problem-related items will be reported earlier in a sequence of items than will solution-related items.

METHODS

This study examined 35 organizational decisions in a single major research laboratory. Each decision concerned initiation of a research project. The individual projects generally involved several person-years of effort. The principal investigators of all projects had been key participants in the decisions to initiate their respective projects. These investigators provided the retrospective reports used in this study. All decisions were strategic in that they (1) determined the directions of principal investigators' careers for several years, (2) allocated scarce resources, and (3) affected the research units' abilities to respond to future organizational or environmental demands by creating new organizational capabilities, such as solutions to problems or researcher expertise. The 35 informants were randomly selected from the 75 principal investigators working in the research laboratory. Every investigator contacted agreed to be an informant.

Each informant was queried with a structured interview lasting approximately 30 minutes and providing the following data: (1) the initiation date of the research project upon which the informant had most recently embarked; (2) the four most important items of information leading to the decision to initiate the project; (3) the sources of all items of information, that is, where investigators had obtained them; (4) the identities of the key information items that led to the project's initiation; (5) the degree to which the project

was basic rather than applied research; and (6) the extent of the investigator's prior knowledge or expertise in the project's area.² A short form that informants completed provided the data for categories 1 and 2 above. Interviews included whatever questions were needed to clarify and classify responses for category 2, and then went on to standardized interview questions to elicit the data described in categories 3 through 6. All informants were interviewed by the same interviewer. Between one and 88 months had elapsed between decisions to initiate projects and this first round of interviews; the median number of months was seven and the mean was 19.

Six months later, each informant received the same interview from the same interviewer as before. The informants did not know that the second round would take place and were not contacted during the six months except for phone calls to arrange for second interviews. The informants were told the truth to explain taking their time to ask exactly the same questions as before; they were told that one purpose of the study was to test the reliability of various research procedures and instruments for obtaining data about organizational decisions. They were also told the results of individual interviews would be anonymous. To reduce the possibility that unintended cues would affect the second sets of responses, the interviewer did not examine the responses from the first interviews until after the second interviews.

Informants did not have access to their responses from their first interview until after the second interview. In addition, it very much seemed during the second interviews that informants were undertaking their task of providing data anew—they seemed to have little recollection of the interview procedure. Accordingly, all procedural explanations were repeated not only to replicate the first interview situation but also because the informants did not remember what they had done in the earlier instance. In contrast, in both interviews informants easily recalled many details of the target decision processes. This difference in recall is not surprising, as decision processes such as these seem much more important and stimulating than a brief interview, not job-related, with a transitory interviewer. Thus, my assumption was that informants' responses were more cognitively linked to decisions than to previous interviews. Such an assumption underlies any test or use of test-retest reliability (Heise, 1969).

Hypothesis 5 addressed the effect of personally-developed information items. Items classified as personally developed were either (1) facts or conclusions that informants had obtained through their own research, or (2) facts or conclusions that informants has inferred. Individuals might, for instance, infer something from relevant literatures or from the comments of others. Facts or conclusions provided by others were not personally-developed items. These included explicit statements in previous studies. The appropriate classification was almost always readily apparent, as informants identified sources of all items. Only a few instances required clarification.

²Key information items were defined for the informant as those items whose absence would have caused the project not to have been initiated.

Hypothesis 6 addressed problem-related items and solution-related items. Unfulfilled scientific, industrial, or societal needs were classified as problem-related. Means or resources for fulfilling such needs, such as technical data, or information about the availability of equipment, were classified as solution-related. Again, only a few instances needed clarification.

RESULTS AND DISCUSSION

Temporal Stability

Hypothesis 1 stated that the content of retrospective reports will be stable across time. It was tested with seven measures of content stability. One was a completeness proportion, obtained for each informant by dividing the number of information items from the first interview into the number of individual items that appeared in both the first and second interviews. The mean of these ratios was .65; 85 of the 130 items from the first interview reappeared in the second. Not all 35 investigators listed 4 items in both interviews. Given the many events that could have occurred during the six month interval, these results indicate moderately high temporal stability. The second measure was another completeness proportion, calculated with only key information items. The mean of these ratios was .90.

These two measures focused on whether informants included items consistently. The study also used five measures to determine whether included information was consistent. Two addressed the stability of ratings classifying research as basic or applied. The difference between the respective means of the first and second sets of ratings, made on scales ranging from 1 to 10, was .35 (5.29 vs. 4.94; $p > .10$, $t = .74$).³ The correlation between the two sets of ratings was .58 ($p < .01$). The results from both measures indicate moderate to high temporal stability, especially in light of two additional considerations: (1) many informants mentioned that the basic-to-applied construct was confusing because it involved two dimensions—research methodology and substantive knowledge; and (2) the informants' research processes and intermediate results could have affected their perceptions of appropriate ratings.

The study also included two measures to address the stability of ratings of degrees of prior knowledge. The difference between the means of the two sets of ratings, made on scales ranging from 1 to 10, was .25 (6.21 vs. 5.96; $p > .10$, $t = .82$). The correlation between the two sets was .76 ($p < .01$), again indicating moderate to high temporal stability. Finally, informants who repeated key items correctly identified them as key in 73 percent of the instances. Altogether, these results suggest that organizational scientists can have a fairly high level of confidence in the temporal stability of retrospective reports from participants in organizational decisions.

³The t-test for paired observations was used.

Elapsed Time

Hypothesis 2 stated that the stability of retrospective reports concerning organizational decisions will not vary across time lapses of moderate duration. The eight simple linear regression models described in Table 1 were used to test this hypothesis. The dependent variable measures included (1) the two completeness proportions described earlier, (2) the absolute differences between the two ratings on the basic-to-applied scale, and (3) the absolute differences between the two ratings on the degree-of-prior-knowledge scale. One elapsed time measure was the number of months between a decision to initiate a project and the first interview about it. The log to base 10 was also used as a measure, to account for the positive skewness. Elapsed time did not affect temporal stability, as shown in Table 1. Nor did it affect either the basic-to-applied ratings or the degree-of-prior-knowledge ratings.

TABLE 1
Correlations and Significance Levels of Simple Linear Regression Models
Examining Temporal Stability as a Function of Elapsed Time

Dependent Variable Measures	Independent Variable Measures ^a			
	Months		Logs of Months	
	<i>r</i>	<i>p</i> <	<i>r</i>	<i>p</i> <
Completeness proportion of all items, $\bar{x} = .65$.02	n.s.	-.04	n.s.
Completeness proportion of key items, $\bar{x} = .91$.15	.20	.12	n.s.
Absolute difference in basic vs. applied research ratings; $\bar{x} = 2.0$	-.20	.13	-.24	.09
Absolute difference in degree of prior knowledge ratings; $\bar{x} = 1.1$	-.11	n.s.	-.22	.11

^aFor purposes of testing the hypotheses, the conventional significance level of $p < .05$ should be used. The table reports all significance levels of $p < .20$ based on two-tailed tests.

Importance

Hypothesis 3 stated that the reliability with which informants include data in retrospective reports is positively associated with the data's importance. Informants mentioned 35 of the 39 information items noted as key items in their first interviews in the second interviews as well. In contrast, they repeated only 53 of the 91 items that were not key items. The difference between these two ratios is significant ($35/39 = .90$ vs. $53/91 = .58$; $p < .01$). Key items appeared more reliably than others and were also more likely to be reliably identified as important; as noted in the previous section, informants correctly identified repeated key items as key a second time in 73 percent of the instances. These findings clearly support the hypothesis.

Response-Order Bias

Hypothesis 4 stated that more important information items will be reported earlier in a sequence of items than will less important items. It was

tested by comparing, in each ordinal position in the sequence of responses, the number of key items with the number of other items. The results shown in Table 2 strongly support this hypothesis. Asking decision participants to identify more than one or two important items may elicit items of substantially lower importance than the first ones given. Hypothesis 5 stated that items concerning personally-developed knowledge will not be systematically distributed in a sequence of items. The results shown in Table 2 support this hypothesis. Hypothesis 6 stated that problem-related items will be reported earlier in a sequence of items than will solution-related items. The results shown in Table 2 support this hypothesis. It appears that reports containing just one or two items concerning initiation of a decision may contain higher ratios of problem-related items to solution-related items than reports containing more items.

TABLE 2
Number of Items by Ordinal Positions in Reports^{a,b}

Types of Items	Ordinal Positions				χ^2	$p <$
	1	2	3	4		
Key ^c	21	9	5	4	21.5	.001
Not key ^c	14	26	29	22		
Personally developed ^d	10	4	10	4	5.0	.18
Not personally developed ^d	25	31	24	22		
Problem-related ^d	26	16	17	9	10.6	.02
Solution-related ^d	7	15	15	15		

^aNot all columns have same total, as some informants listed fewer than four items.

^bFor purposes of testing the hypotheses, the conventional significance level of $p < .05$ should be used.

^cRecall that there could be more than one key item or, conceivably, no key item. Therefore the row total need not equal the number of respondents (35). One consequence of this is that the response values (0 or 1) are independent, thus permitting the use of a χ^2 test rather than a Cochran's Q test.

^dNot all columns have the same total, as not all could be classified into the two row categories.

SUMMARY AND CONCLUSIONS

This study had three main findings. (1) Temporal stability was moderate to high across seven different measures over an interval of six months. (2) Stability was not significantly related to how much time elapsed between the making and first reporting of decisions. (3) The most important, or key, items were more stable than other important items. The first two findings are encouraging. The last finding, that item inclusion was a function of perceived importance, may or may not be encouraging. This determination depends on whether researchers want importance judgments to influence reporting and also on whether they are interested in obtaining information about items that informants do not consider important.

This study found two response-order biases. Informants mentioned more important information items earlier in sequences than less important items. They also mentioned problem-related items earlier than solution-related items. Researchers who are comparing results from studies that vary systematically as to the extensiveness of informants' reports should see these findings as especially important.

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IN THE EYE OF THE BEHOLDER: A REPLY TO ILGEN AND MOORE

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A recent note by Ilgen and Moore (1983) criticized various procedures described and conclusions drawn in a paper by Crino, White, and DeSanctis (1981). Two issues were central to their discussion: (1) the reliability of the Women as Managers Scale (WAMS), including the relationships between reliability and dispersion, and reliability and dimensionality; and (2) the appropriateness of using principal components analysis to investigate dimensionality.

RELIABILITY OF THE WOMEN AS MANAGERS SCALE (WAMS)

Ilgen and Moore stated: "when the split-half reliability coefficients are .85 or greater (assuming that the items on the WAMS were randomly arranged with respect to content) it seems to be of little value to go searching for more than one dimension" (1983: 539). However, the items on the WAMS are not randomly arranged with respect to content. Crino and his colleagues (1981) used the instrument that Terborg, Peters, Ilgen, and Smith (1977) presented; it is blocked on the original developmental components. A developmental study (Peters, Terborg, & Taynor, 1974) clearly states this blocking in its Appendix B; moreover, Table 6 of Crino and colleagues' study (1981: 872) also very clearly presents this blocking. An odd/even estimate of reliability under these circumstances does not directly address the dimensionality of the instrument; both portions of the instrument include items from all components in fairly equal numbers.¹

Further, Ilgen and Moore dismissed as an insignificant issue the differential subgroup reliability reported, even though it was clearly identified as a symptom of a more serious concern — nonhomogeneity of variance. Although recognizing the importance of this issue, they made a point of stating that it had nothing to do with the differential reliability found. They appeared to be unaware of the relationship between dispersion and the size of a reliability estimate. This is an important issue and one that has received considerable attention in the literature (e.g., Nunnally, 1978: 241).

Ilgen and Moore also stated that coefficient alpha should have been the method used to estimate the dimensionality of the WAMS, as it is always superior to any factor analytic technique. This position ignores a literature cautioning against such indiscriminate use of coefficient alpha (Cronbach, 1951: 324; Green, Lissitz, & Mulaik, 1977; Revelle, 1979).

DIMENSIONALITY OF THE WAMS

A major concern in Ilgen and Moore's paper was Crino and colleagues' use of principal components analysis. This analysis was selected in part because the instrument's originators (Peters et al., 1974) reported using it as their data reduction technique in its development. Thus, it seemed that use of principal components analysis would facilitate comparison with the original work. Further, there has been considerable support for the use of principal components to reduce data and to determine the number of factors underlying a correlation matrix (Harris, 1975; Kaiser & Rice, 1974; Nunnally, 1978). More specifically, as Nunnally wrote: "when there are at least 20 variables to be employed in exploratory factor analysis, it is strongly recommended that unities be placed in the diagonal spaces and that component analysis be undertaken" (1978: 418).

Basing their position upon a statement by Kendall (1961) that for every nonzero eigenvalue there exists a dimension with a probability of 1.0, Ilgen

¹See, for example, Campbell, 1976: 192.

and Moore also implied that the Kaiser-Guttman criterion (Kaiser & Rice, 1974) of using only factors with "eigenvalues greater than 1" or any such decision rule (e.g., a scree test) is misapplied when principal components analysis is used. It is their position that all dimensions with nonzero eigenvalues must be retained. Ironically, Kendall (1980: 18) quite clearly disagrees with this strict interpretation of his earlier remarks in his chapter on principal components, as does Nunnally (1978) in his text on psychometric theory: "Although available tests of statistical significance should be considered . . . the solution is to use all unrotated factors that have characteristic roots (latent roots or eigenvalues) that are greater than 1.00 for subsequent rotation" (Nunnally, 1978: 422).

Although Ilgen and Moore rightly questioned the practice of determining the number of dimensions underlying a correlation matrix solely through the use of factor analysis, they created the erroneous impression that techniques other than principal components would have resulted in a unidimensional solution.

In order to illustrate that a multidimensional solution is likely to result with the application of a variety of factor analytic techniques and decision rules, we collected additional WAMS data. We administered the WAMS to women business communication students ($n = 241$) in a southeastern business college. The data gathering procedures were consistent with those of the previous study (Crino et al., 1981). To determine the appropriate number of factors to retain we used the following: (1) the Kaiser-Guttman criterion (Kaiser & Rice, 1974); (2) the scree test (Cattell, 1966a, 1966b); (3) Horn's (1965) test, as well as modifications of that test proposed by Humphreys and Ilgen (1969) and by Crawford and Koopman (1973); (4) Bartlett's (1950) test; and (5) Lawley and Maxwell's (1963) test. We also extracted alpha factors (Kaiser & Caffrey, 1965), image components (Guttman, 1953), and Harris factors (Harris, 1962) in order to provide insight into the number-of-factors problem for these data.

Table 1 summarizes the results of all the techniques that we considered. An examination of this table indicates the wide disparity among the results for the various tests. Using Harris factors or image components we derived one factor; using the Horn test based on image components we derived sixteen. These results clearly indicate the difficulties involved in trying to determine the correct number of factors to extract. In the face of such results, researchers must resort to whatever theoretical knowledge they have about problems. All but two of the tests we applied indicated that more than three factors should be retained. Thus, a reasonable and parsimonious approach would be to retain the same number of factors—three—that the instrument's developers (Peters et al., 1974) originally built into it.

This was the position taken in the previous study (Crino et al., 1981), although Ilgen and Moore created the impression that we seriously advocated five and six factor solutions blindly based on the Kaiser-Guttman criterion. In any case, the results of these tests provided little compelling empirical evidence in support of Ilgen and Moore's preference.

TABLE 1
Summary of Results for Number of Factors

Test	Reference	Number of Factors
Kaiser-Guttman		
Unadjusted matrix	Kaiser & Rice (1974)	6
Adjusted matrix	Kim & Mueller (1978: 43)	11
Scree		
Unadjusted matrix	Cattell (1966a)	5
Adjusted matrix	Cattell (1966b: 206)	6
Horn		
Unadjusted matrix	Horn (1965)	2
Adjusted matrix	Humphreys & Ilgen (1969)	8
Harris factors	Crawford & Koopman (1973)	9
Image components	Crawford & Koopman (1973)	16
Bartlett	Bartlett (1950)	9
Lawley-Maxwell	Lawley & Maxwell (1963)	5
Harris factors or image components	Harris (1962)	1
	Guttman (1953)	
Alpha factors	Kaiser & Caffrey (1965)	6

CONCLUSION

Manuscripts such as *When reason fails . . .* (Ilgen & Moore, 1983) can serve a very useful purpose, and most certainly contribute to the credibility of our literature. However, it is the responsibility of a critical manuscript to show that a manuscript being criticized is clearly flawed. At first reading it would seem that *When reason fails . . .* does reveal flaws. However, further investigation discredits this notion. Examining Crino and colleagues' (1981) manuscript with some care, reviewing the developmental work on the WAMS (Peters et al., 1974), and consulting a standard psychometric theory text (Nunnally, 1978) show that Ilgen and Moore did not meet this responsibility. Further, it appears that no failure of reason in the study criticized accounts for their primary objections to the techniques employed and conclusions reached. Rather, their objections are very much in the eyes of the beholder.

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THE ROLE OF SOCIAL-DESIRABILITY RESPONSE BIAS IN TURNOVER RESEARCH

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The employee turnover process has received a significant amount of attention in the organizational behavior literature over the past 25 years. Review articles have summarized a variety of models of the determinants of turnover (e. g., Mobley, Griffeth, Hand, & Meglino, 1979; Porter & Steers, 1973; Steers & Mowday, 1981), and recent empirical research has reported tests of such models (e. g., Arnold & Feldman, 1982; Muchinsky & Tuttle, 1979). Although the various models of the determinants of turnover appear conceptually rich and complex, the results of empirical research on such models have often been disappointing. Zero-order correlations between turnover and various predictor variables such as job satisfaction, organizational commitment, age, and the like rarely exceed .30, and multiple correlations generated from complex multivariate models of the turnover process rarely exceed .45 (e. g., Arnold & Feldman, 1982).

One factor that may attenuate the strength of observed relationships in empirical research on turnover is social-desirability bias (Crowne & Marlowe, 1964) in measures of the variables employed. This construct refers to some individuals' tendencies to overreport socially desirable personal characteristics and to underreport socially undesirable characteristics. Recently, a number of investigators have explored the effects of such bias toward socially desirable responses on the validity of self-reported measures (Arnold & Feldman, 1981). Authors have also explored the moderating effects of social-desirability bias on observed relationships among several variables commonly employed in organizational behavior research (Ganster, Hennessey, & Luthans, 1983). Ganster and colleagues concluded that the assessment of the effects of bias toward socially desirable responses is particularly important in studies in which the central hypotheses involve self-inventories like self-reports of effort, motivation, performance, and attitudes. Models of the turnover process universally employ a number of self-reported variables such as

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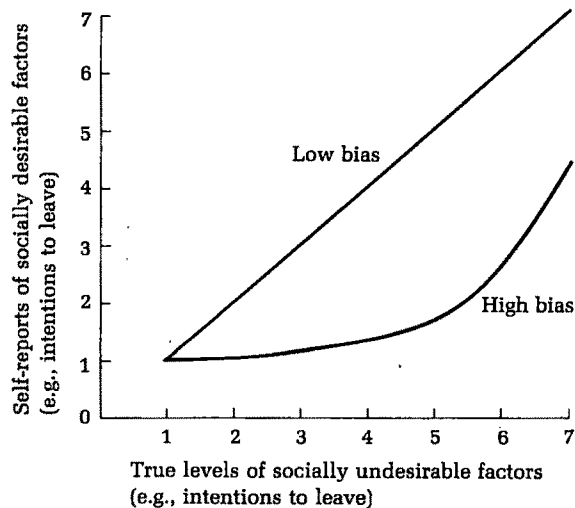
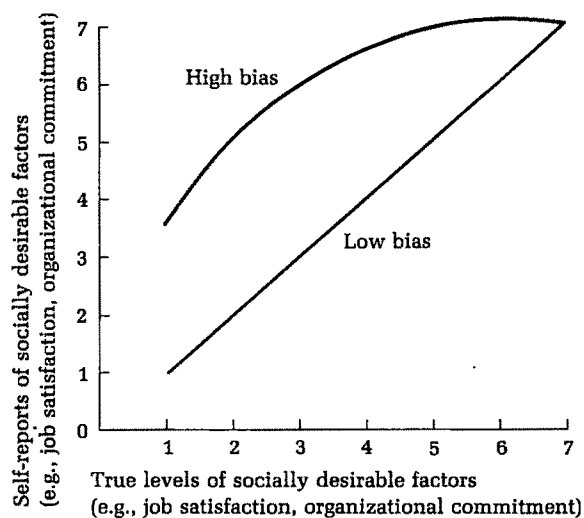
job satisfaction, organizational commitment, intentions to leave organizations, and so on. Thus, it seems particularly likely that findings in the turnover literature may be subject to attenuation as a consequence of bias toward socially desirable responses affecting measures of hypothesized causal variables. The purpose of this research was to develop and test a model of the effects of social-desirability bias on turnover investigations.

Since social-desirability bias is a response bias, before developing hypotheses regarding its effects on observed relationships between hypothesized causal variables and turnover, we first needed to explore how this bias might influence individuals' responses to items designed to measure such variables. To do this we needed a model of the effects of social-desirability bias on the relationship between (1) true underlying psychological values of relevant variables and (2) self-reported levels of these variables generated by individuals in response to questions designed to measure the variables. We expected that social-desirability response bias would cause individuals to overreport such socially desirable factors as job satisfaction and organizational commitment and to underreport such socially undesirable factors as intentions to leave organizations. Figure 1 summarizes these hypothesized relationships between true and self-reported levels of such variables. Our hypothesis was that social-desirability bias would cause individuals to distort self-reports equally across the range of true underlying values. However, the floor and ceiling effects of any measurement scale that can be employed in obtaining self-reports introduces curvilinearity into the observed relationships. These effects in turn result in the predicted convergence of the curves for high and low bias toward socially desirable responses in Figure 1.

The rationale for these predicted patterns of relationships is as follows. According to a common stereotype, intelligent, effective, and competent individuals make good career and job choices and hence can work in desirable organizations at interesting and satisfying jobs. Good fits between competent individuals and their jobs and organizations then create the stereotype that such people have high degrees of job satisfaction and organizational commitment and strong intentions to stay with their current organizations. To the extent that people tend to respond to questions in a socially desirable fashion, their self-reports concerning job satisfaction, organizational commitment, and intentions to leave organizations will be biased away from their true underlying cognitions; these self-reports will instead tend to represent levels of these variables that fit their stereotyped conceptions of how competent and successful people feel about their jobs and organizations. To the extent that such a process is operating, we would observe the patterns of relationships between true and self-reported levels of these variables that Figure 1 shows.

However, the hypothesized relationships Figure 1 presents cannot be directly tested empirically. What we have referred to as true underlying levels of psychological variables are unobservable. However, if our hypotheses regarding the effects of social-desirability bias on self-reports of job satisfaction, organizational commitment, and intentions to leave are valid,

FIGURE 1
Hypothesized Relationships between True Underlying Psychological Values and Self-Reported Values for Individuals High and Low on Social-Desirability Bias



the patterns of relationships between these variables and turnover behavior should differ depending on whether individuals have high or low tendencies to make socially desirable responses. Figure 2 summarizes these differential patterns of relationships that are amenable to empirical testing.

METHODS

Subjects

Data came from a sample of Canadian Chartered Accountants; this designation is roughly equivalent to that of C. P. A. in the United States. We mailed questionnaires to a random sample of 2,351 members of the Canadian Institute of Chartered Accountants (CICA) and got back 1,058 questionnaires, for a 45 percent response rate. We collected turnover data one year after questionnaire administration. The final sample for which complete data were available on all variables consisted of 826 individuals. Their average age was about 37 years, and their average tenure with their organizations was about 5 years. A total of 185 persons (22.5%) had changed organizations during the year.

Measures

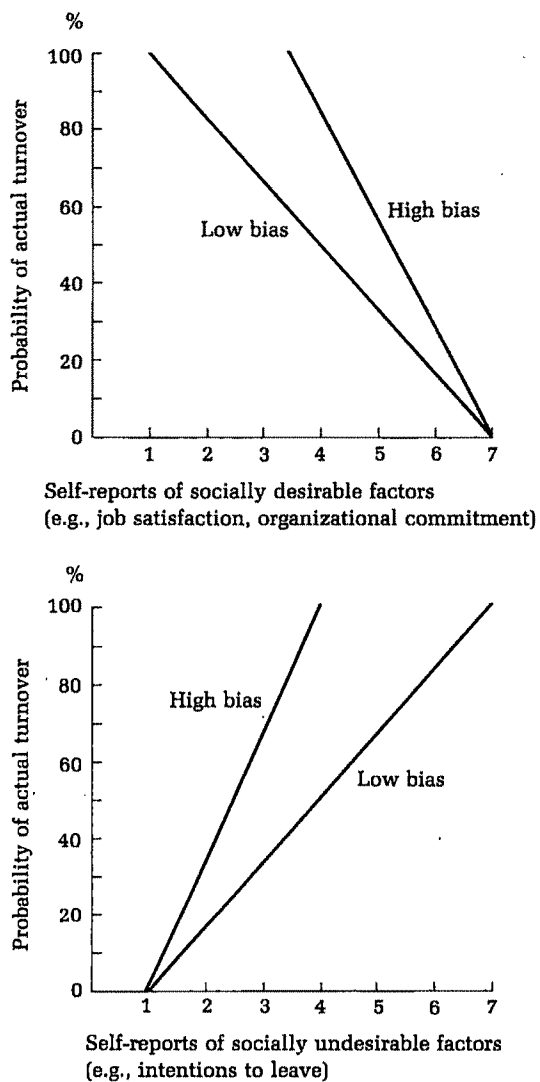
The questionnaire included measures of several factors whose role in determining turnover has been previously investigated. The independent variables included in the questionnaire that form the basis of the current research were job satisfaction, organizational commitment, intentions to search for new positions, and intentions to leave organizations.

Investigators have consistently found job satisfaction to be negatively related to turnover (Mobley et al., 1979; Porter & Steers, 1973). We assessed job satisfaction with the following measures. (1) A 28-item Porter-type scale asked respondents to describe on a 7-point scale how much of each characteristic there "is now" ($\alpha = .93$) and how much of the characteristic there "should be" ($\alpha = .92$) in their current positions. (2) A single item with a response scale from 1, strongly dissatisfied, to 7, strongly satisfied, asked "When you take into consideration the various aspects of your present work, including your organization, how satisfied are you in general?" (3) A single item with a response scale from 1, strongly disagree, to 7, strongly agree, stated "All in all I am satisfied with my job." The correlations among these measures of job satisfaction varied from .62 to .73, and the patterns of results obtained with each of the measures were nearly identical. Thus, the results reported employ the single-item measure of satisfaction referred to in item 3 in this paragraph.

Previous research has also shown organizational commitment to be significantly and negatively related to turnover (e. g., Porter, Crampon, & Smith, 1976; Porter, Steers, Mowday, & Coulian, 1974; Steers, 1977). We measured organizational commitment with Porter and colleagues' 15-item scale ($\alpha = .01$).

In light of Mobley's (1977) distinction between intention to quit and intention to search for alternatives, measures of both types of intentions figured in this research. We assessed both intention variables with items employing

FIGURE 2
Hypothesized Relationships between Self-Reported
Values and Likelihood of Actual Turnover
for Individuals High and Low on Social-Desirability Bias



7-point response scales from 1, highly unlikely, to 7, highly likely. The question, "How likely is it that you will actively look for a different organization in the next year?" measured search intentions, and "Do you intend to change the organization with which you are now associated?" measured intentions to quit.

The 33-item Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1964) assessed individuals' tendencies toward socially desirable responses. These authors reported both internal consistency and test-retest reliability coefficients of .88. In the present sample, $\alpha = .81$.

Turnover was assessed by comparing the business addresses of CICA members on the annual membership list we used for mailing the questionnaires with the addresses on this list one year later. We deemed individuals to have changed organizations if their organizational affiliations and mailing addresses on the second list were different from those on the first list. We included only respondents with business addresses on both lists in the final sample. Of the 1,058 respondents, 826 had listed business addresses at both times.

To assess whether data losses might have introduced sources of bias to the final sample, we made a number of comparisons. First, we compared the proportions of individuals for whom business address listings were available at both times among respondents and nonrespondents. For the respondents, 826 of 1,058, or 78 percent, met the criterion; the proportion was almost identical for the nonrespondent sample, in which 1,008 out of 1,293 met the criterion. Second, we compared turnover for respondents and nonrespondents. This rate was 22.5 percent (186 out of 826) for respondents and 20.5 percent for nonrespondents (207 of 1,008 persons); these turnover rates did not significantly differ from one another ($z = 1.03$, *n. s.*).

Our hypotheses regarding the effects of social-desirability bias on the relationships between various independent variables and turnover were framed in terms of the likelihood of actual turnover behavior (Figure 2). However, we can only measure probability of turnover for individuals through self-reports of intentions or likelihood of leaving. Our goal was to analyze actual turnover behavior. Moreover, self-reports of intentions to leave are themselves subject to social-desirability bias; such reports are in fact independent variables whose relationship to actual turnover is of interest. Thus, we needed a surrogate behavior-based measure of probability of turnover. To obtain such a surrogate measure, we aggregated individuals into groups on the basis of their scores (1) on the independent variables and (2) on the Marlowe-Crowne Social Desirability Scale; then we computed the rates of turnover within each of these groups.

In order to carry out these analyses, the sample was classified into high and low subgroups on each of the variables. This classification into subgroups allowed direct tests of the hypothesized effects of social-desirability bias through comparing turnover rates for individuals classified high or low on their tendencies to show this bias. We established the high and low subgroups as follows. For the three independent variables that were mea-

sured on 7-point scales—job satisfaction, intentions to search for new positions, and intentions to leave organizations—we dropped the middle response category (4) and classified responses of 1, 2, and 3 as low and 5, 6, and 7 as high. We used a comparable strategy for organizational commitment, designating individuals with commitment scores from 15 to 52.5 as low, and those with scores from 67.5 to 115 as high. For social-desirability bias, we obtained subgroups by taking the top and bottom quartiles based on scores on the Marlowe-Crowne scale.

RESULTS

Tables 1 through 5 and Figure 3 summarize results of the analyses. Table 1 contains a complete matrix of correlations among the variables; Tables 2 through 5 compare turnover rates within each of the relevant subgroups on each of the variables. Figure 3 graphically portrays the differences in turnover rates observed in the low and high bias subgroups. The results supported our hypotheses concerning the effects of social-desirability bias for job satisfaction, organizational commitment, and intentions to search for new positions. The hypothesized pattern did not emerge for intentions to leave organizations.

A binomial test was employed to determine the level of statistical significance of observed differences in turnover rates for the low and high bias subgroups. Our hypotheses regarding the effects of social-desirability bias specified the directions of the differences expected for subgroups low on job satisfaction and organizational commitment and high on intentions to search and intentions to leave. Thus, we employed one-tailed tests of significance in assessing differences in turnover rates. Since we had hypothesized no significant differences between low and high bias subgroups when satisfaction and commitment were high and when intentions to search and to leave were low, we used two-tailed tests of significance in testing these differences. The patterns of significance were consistent with the hypothesized effects of social-desirability bias for job satisfaction, organizational commitment, and intentions to search for new positions, but not for intentions to leave organizations. For individuals self-reporting low levels of job satisfaction, the subgroup classified as high on social-desirability bias had a significantly higher turnover rate (71.4%) than the subgroup low on this bias (39.3%; $z = 1.96$, $p < .01$). Of the subgroup classified as low on organizational commitment, the high-bias subgroup evidenced a significantly higher rate of turnover (54.0%) than the low-bias subgroup (34.4%; $z = 1.93$, $p < .01$). Finally, among those individuals labeled high on intentions to search for new positions, the turnover rate was significantly higher for the subgroup high on social-desirability bias (53.6%) than for the subgroup low on this bias (19.6%; $z = 3.03$, $p < .01$). For all three of these independent variables, the observed turnover rates did not differ significantly for low- and high-bias groups under conditions for which no differences were hypothesized.

FIGURE 3
Turnover Rates Broken Down by the Four Independent Variables
and by Levels of Social-Desirability Bias

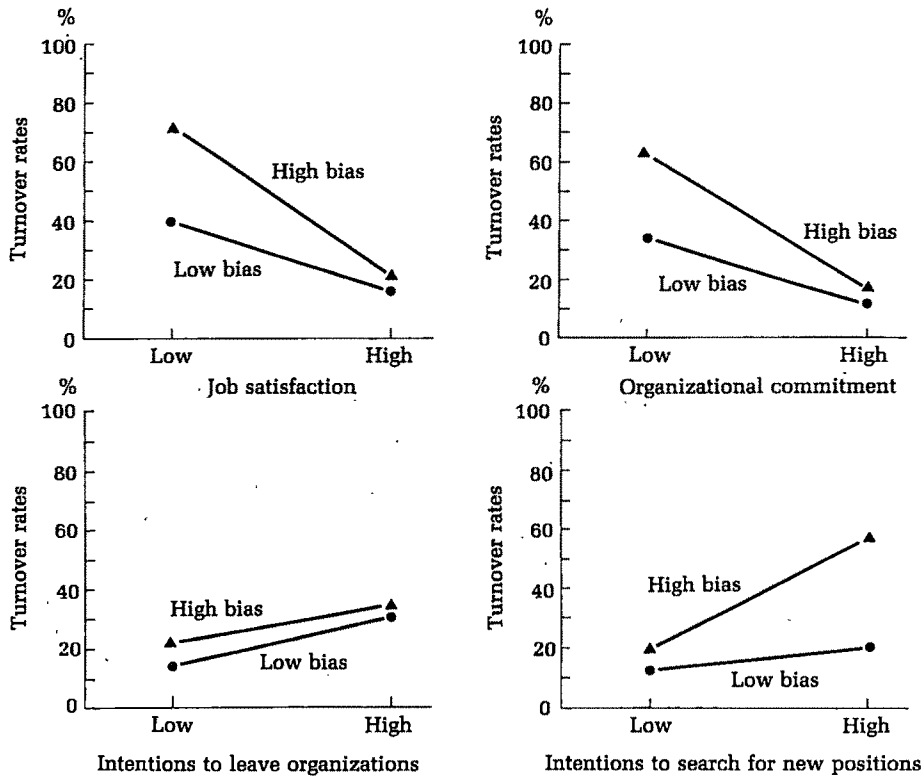


TABLE 1
Correlations among All Variables

Variables	1	2	3	4	5
1. Turnover					
2. Job satisfaction	-.25**				
3. Organizational commitment	-.27**	.71***			
4. Intention to search	.34***	-.56***	-.67***		
5. Intention to change	.21**	-.30***	-.40***	.55***	
6. Social-desirability bias	.02	.08*	.11**	-.07*	-.05

* $p < .05$

** $p < .01$

*** $p < .001$

TABLE 2
Turnover Rates Broken Down by Levels of Job Satisfaction
and Social-Desirability Bias

Job Satisfaction	Social-Desirability Bias								
	Low			High			Means		
	% ^a	# ^b	N ^c	% ^a	# ^b	N ^c	% ^a	# ^b	N ^c
Low	39.3	11	28	71.4	10	14	50.0	21	42
High	16.1	28	174	21.1	42	199	18.8	70	373
Means	19.3	39	202	24.4	52	213	21.9	91	415

^aPercentage of individuals who left.

^bNumber of individuals who left.

^cSample size in cell.

TABLE 3
Turnover Rates Broken Down by Levels of Organizational Commitment
and Social-Desirability Bias

Organizational Commitment	Social-Desirability Bias								
	Low			High			Means		
	% ^a	# ^b	N ^c	% ^a	# ^b	N ^c	% ^a	# ^b	N ^c
Low	32.1	9	28	61.9	13	21	44.9	22	49
High	12.2	17	139	16.8	28	167	14.7	45	306
Means	15.6	26	167	21.8	41	188	18.9	67	355

^aPercentage of individuals who left.

^bNumber of individuals who left.

^cSample size in cell.

TABLE 4
Turnover Rates Broken Down by Levels of Intentions to Search
and Social-Desirability Bias

Intentions to Search	Social-Desirability Bias								
	Low			High			Means		
	% ^a	# ^b	N ^c	% ^a	# ^b	N ^c	% ^a	# ^b	N ^c
Low	12.4	19	153	19.0	34	179	16.0	53	332
High	19.6	9	46	53.6	15	28	32.4	24	74
Means	14.1	28	199	23.7	49	207	19.0	77	406

^aPercentage of individuals who left.

^bNumber of individuals who left.

^cSample size in cell.

TABLE 5
Turnover Rates Broken Down by Levels of Intentions to Change
and Social-Desirability Bias

Intentions to Change	Social-Desirability Bias								
	Low			High			Means		
	% ^a	# ^b	N ^c	% ^a	# ^b	N ^c	% ^a	# ^b	N ^c
Low	12.9	16	124	21.2	31	146	17.4	47	270
High	29.9	20	67	33.3	16	48	31.3	36	115
Means	18.8	36	191	24.2	47	194	21.6	83	385

^aPercentage of individuals who left.

^bNumber of individuals who left.

^cSample size in cell.

DISCUSSION

Individuals high on social-desirability bias whose (1) self-reported levels of job satisfaction and organizational commitment were low, or (2) whose self-reports of intentions to search for new positions were high, had higher rates of observed turnover than individuals low on this response bias. This pattern of results is consistent with the hypothesis that individuals with high degrees of social-desirability bias will tend to overreport levels of job satisfaction and organizational commitment and to underreport levels of intentions to search for new positions.

The only exception to the predicted pattern of results occurred for intentions to leave organizations. There was no significant difference in the rates of turnover of the subgroups that were high and those that were low on social-desirability bias when intentions to leave were classified as high. A generalized tendency—*independent of social-desirability bias*—to underreport intentions to leave organizations may explain this lack of observed difference. To the extent that individuals fear reprisals or negative consequences if they admit they intend to leave organizations, they would tend to underreport such intentions. Such a generalized bias would result in: (1) a washing-out of predicted effects of social-desirability bias when self-reports are classified as high; and (2) a relatively small difference in turnover rates between those classified as low and high on intentions to leave. Our results showed both elements.

The results also raised issues regarding how researchers might go about dealing with the problems generated by social-desirability bias. Clearly, the first implication is a need for researchers to include measures of social-desirability bias in data collection instruments that employ self-reports. Including such measures would permit analyses of the existence and degrees of effects of social-desirability bias in a variety of research settings. If others obtain effects for this bias similar to our results, it will become possible to control for such effects, or to partial out these effects from hypothesized

relationships of interest. Settings in which effects of social-desirability bias are found to be pronounced would call for the development of alternative measurement instruments that might be less prone to such influences.

Of additional interest from a practical standpoint are the rather high rates of turnover observed under certain conditions in the subgroups with high levels of social-desirability bias. These high rates occurred when satisfaction was low (71.4%), when organizational commitment was low (54.0%), or when intentions to search for new positions were high (53.6%). The results for job satisfaction and intentions to search reported in this study were based upon single-item measures. This implies that (1) knowledge of levels of social-desirability bias combined with (2) low-cost, single item self-reports of factors like job satisfaction, may permit identification of employee groups whose expected levels of turnover may be quite high. Such information could help management focus attention upon groups of individuals highly likely to leave organizations which would be particularly desirable if members of such groups were also effective and valuable members of their organizations. Naturally, applying such a technique for identifying employees at high risk of leaving in organizations outside the accounting profession must await evidence of the generalizability of our results.

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SUBJECT INDEX

The logic followed for this index was to put each entry under a broad category and then use subheadings for greater specificity. An example might be "Goals, difficulty of," or "Structure, organizational, matrix." Statistical methods or research designs were indexed if the author(s) included a significant discussion of the technique. The population being studied was also indexed if it was an identifiable group. This included particular industries, types of organizations, nationalities, occupations, and women if they were analyzed as a group. See and See also are intended to refer the user to a different entry or to an additional entry.

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For more information or submissions contact the regional chairperson listed.

SOUTHWEST—March 12-15, Hyatt Regency, Dallas, Texas.
Linda Calvert, (713) 488-9420
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University of Houston-Clear Lake
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Houston, Texas 77058

WESTERN—March 20-22, MGM Grand, Reno, Nevada.
Patrick Connor, (503) 370-6444
Graduate School of Management
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Salem, Oregon 97301

MIDWEST—April 17-19, Park Terrace Airport Hilton, St. Louis, Missouri.
Kenneth W. Wexley, (517) 353-5415
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EASTERN—May 7-10, The Hershey Hotel, Philadelphia, Pennsylvania.
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School of Business
State University of New York at Albany
Albany, New York 12222

SOUTHERN—November 12-15, Atlanta Hilton, Atlanta, Georgia.
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College of Business Administration
University of South Carolina
Columbia, South Carolina 29208

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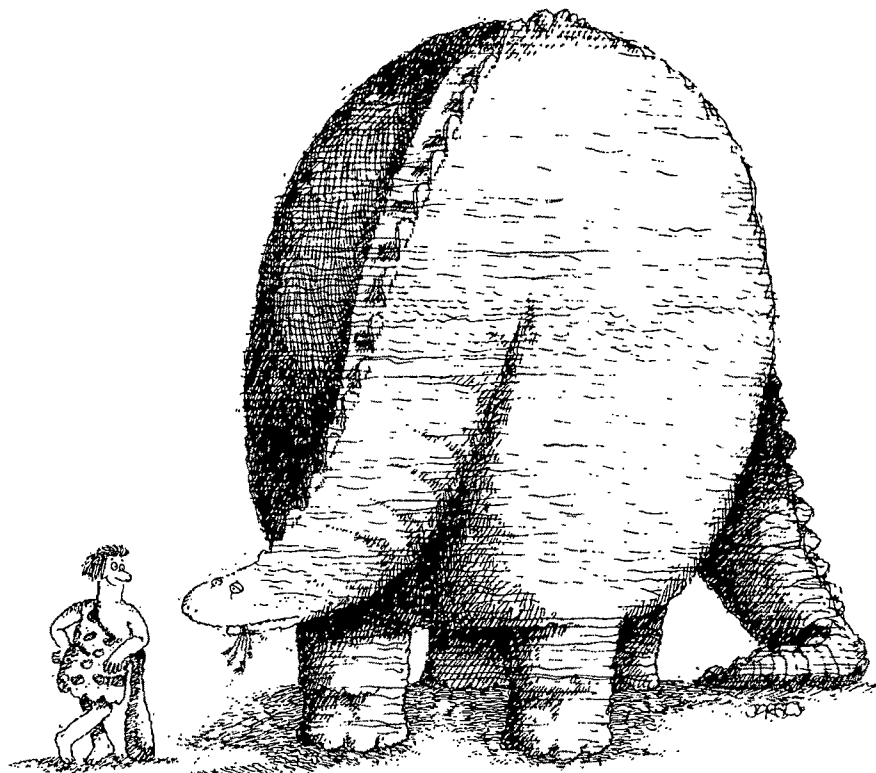
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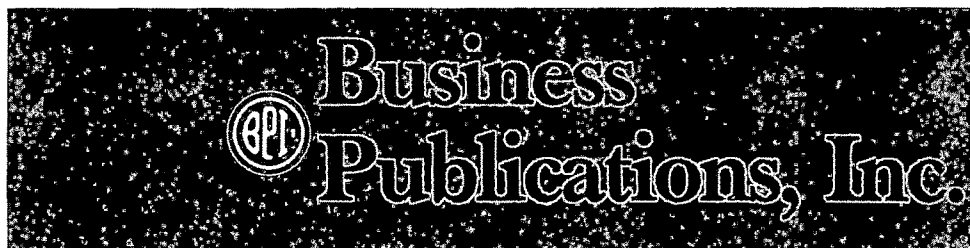
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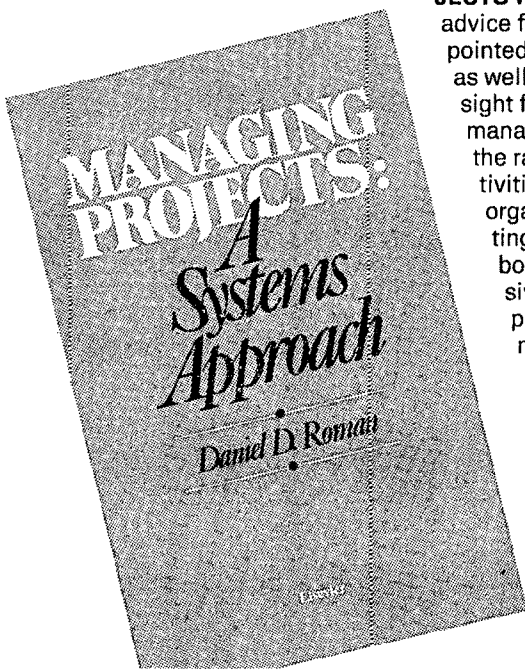
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